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PUMPING CONTRACTS FOR IRRIGATION.

The rapidity with which irrigation is being applied to farm lands in the West, and more especially in the arid districts, has caused a rapid development of the electric power companies which supply such rural territory. In order to keep pace with developments in this field it is necessary that every power engineer or solicitor handling this line of business should be on the alert and keep in touch with every new development in this line.

It is an erroneous view that a solicitor for pumping contracts need only be versed in the knowledge of the motors applicable to this class of work. The solicitors should be prepared to solve the problems which confront the farmer contemplating an installation of this kind. They should be able to advise him of a plant adapted to his particular needs and capable of supplying his farm with an adequate amount of water per acre at a minimum cost per year. This requires a thorough knowledge of the soils in the territory and of the prevailing climatic conditions in order to determine the necessary quantity of water during the irrigation season to produce the best results. The solicitor should acquaint himself with the facts as to the depth at which water can be found at various points in his territory, the capacity of wells already in operation, and he should know also the average revenue derived from different kinds of crops common to the territory, in order that he may properly estimate the most advisable size of plant for the installation. Unless an adequate amount of water can be supplied at a cost which is not so high as to materially reduce the profit on the crop, the installation will not be looked upon by the farmer and by his neighbors as a success. While this may appear to place upon the solicitor considerable work in a line for which the power company is not actually responsible, it has been demonstrated only too clearly that the farmer will not be educated to the use of electric power except through such efforts on the part of the distributing company, and it behooves every such power company to see to it that its solicitors are properly informed on these subjects and capable of discussing irrigation problems in an intelligent manner. The farmer will place more confidence in the solicitor who shows such familiarity with the subject and when one such plant is installed in a community it is far easier to secure other contracts.

Under some conditions the gas engine will be

found a strong competitor of the electric motor for pumping purposes. Aside from questions of cost, ease of operation, lack of trouble and repairs, it is well to bear in mind the portability of a small motor and the ease with which it can be applied to other operations than pumping. There are only certain seasons of the year, and in raising some crops only particular weeks of the season, when it is desirable to irrigate, and it should be emphasized that at other times a motor can be very readily applied to other operations on the farm and around the house, which are much more readily performed by the aid of such power.

In many parts of the country irrigation is still in an elementary stage, but it is progressing rapidly, and especially so in communities where power for the purpose is available. Perseverence, tact and an ability on the part of the solicitor to familiarize himself with all the elements entering into the problem before him, will generally result in obtaining contracts.

DEPENDING ON EXTRAS FOR PROFITS.

In order to keep doing business, the electrical contractor must get more for his work than the cost of labor and material. Interest on the money tied up in his business, rents, insurance, his own salary and that of his office help, and other similar items, must be taken care of. It is highly desirable that every installation he undertakes, and every part of every installation, should bear its proportionate share of such expenses as these.

It is understood, of course, that this is no announcement of a new principle; it is merely stating one again which has been so often and so strongly emphasized already that we might easily suppose that the desired condition was, by this time, becoming quite general. In fact, there has been much improvement in the matters of regulating prices and securing reasonable compensation in electrical contracting. But there is much room for still further improvement.

A practice which continues with very unfortunate persistence, in some quarters, is that of depending upon items not specifically mentioned in the contract for profits on a given job of electrical construction. Cases often arise where the well informed contractor can readily see that the specifications on which he is asked to bid lack a great deal of including all the work which the successful bidder may expect to have an opportunity to install. The building may be of such a type, for example, that the contractor can feel practically certain that a lot of signal wiring and telephone work not mentioned in the contract will have to be installed; and so there may even be good reasons for supposing that, ultimately, the extra work will amount to about as much as the straight contract work itself. The temptation to undertake the contract work at cost, in the hope of making compensating profits on such extras is often very great. How frequently the temptation is yielded to is history too familiar to need to be dwelt upon.

Any justification of this practice, further than that competition may seem to make it necessary, is hard to find. Looked at in the light of professional ethics and business sanity, the practice is distinctly bad always. A reasonable price must be secured for all work undertaken or else the charges for some of it must be excessive, and excessive charges are wrong in principle and usually prove injurious, in the long run, to the business of the man who makes them. Moreover, depending upon extras for profits is an exceedingly unsafe procedure. Extras thought to be certain are sometimes given to somebody else. An instance of this kind is recalled, where a contractor in a small city was depending upon the sale of the fixtures to keep him from losing money on a building he was wiring. A competitor finally got the order for the fixtures.

The remedy for the condition referred to above lies with the contractors themselves. It is largely a matter for individual action. The man who declines to undertake an installation except on what he knows to be the proper terms may lose certain jobs whose desirability is questionable, but will establish a reputation which will bring more contracts in the long run.

CENTRAL-STATION DESIGN AND LABOR COSTS.

The problem of reducing the cost of attendance in the modern central station is second only in importance to that of fuel economy. A close study of the operating conditions in plants of various sizes indicates that too little attention has been paid to the relation between station design and labor cost, and that many installations otherwise excellent are handicapped by arrangements of equipment and types of apparatus which are anything but efficient. The central station industry as a whole needs more information than it now possesses upon the actual payroll requirements of different sizes and types of plants, and a thorough investigation of the subject by an appropriate committee of the National Electric Light Association would be most timely. Such a study might well include skeleton plans of a large number of stations of the steam and hydroelectric type, tabulations of the number of attendants required in each section of the plant, log sheets showing the hours of service of each man on a representative day, the times of starting different generating and auxiliary units, and the variations in load from hour to hour. Rates of pay might profitably be included for each class of station service, and in general, the same sort of analysis could be made that an efficiency expert carries forward with respect to factory labor.

Any such study as this is bound to disclose many

weak points in design and operation which can be remedied in future practice. Some of these may be mentioned at this time. The factor of available operating space is one of the most important and closely associated with it is the location of auxiliaries with respect to the prime movers. In order that the attendance shall be reduced to the safe minimum per shift, every piece of machinery in the plant must be accessible—a simple requirement in the abstract, but exceedingly difficult in the concrete. Overhead cranes must cover the total installation in charge of the operating engineer, and the spacing between all main and auxiliary units should permit the quick removal of the largest single piece subject to emergency repairs and replacement. The location of auxiliaries in bays out of reach of the crane adds far more to the cost of repairs than is usually realized, on account of the time lost in transferring heavy parts to and from the machine sites. Again, the crowding of pipes and valves to save a few hundred dollars in building cost tends to increase the labor charges, and the inadequate lighting of basements, coal conveyors, crusher houses or pits and pump rooms lengthens the time needed to inspect and maintain equipment. We all know the practice of lighting passageways between machinery foundations, condensers, pumps and heaters of single 16-candlepower carbon lamps hung by flexible cord from the ceiling of the basement, the lamps being without reflectors of any kind and generally allowed to accumulate dirt and spattered oil for weeks at a time. A change is in sight in this branch of station work, and it has already gone so far in one engineering house that every plant designed by the firm is provided with a complete set of lighting plans and elevations as well as with drawings of the piping, building sections and machinery layouts.

False economy in the design of station structures leads to excessive labor costs. In these days of reinforced concrete, far better arrangements of machinery and plant departments can be made for a given expenditure than in the brick-and-steel period of the late nineties. With skilful designing the floor levels can be made uniform; the switchboard can be carried at a commanding elevation when desirable, without serious expense for its supports; and ceiling spans can be extended enough to cut down obstructive columns to the minimum. It should not be forgotten that it will pay to spend several thousand dollars for a larger working area in the station for every man whose services can be dispensed with. The possibilities of overlapping shifts are also worth considering.

It is probably not generally realized that snap switches are available, under the National Electrical Code, for use as service switches for installations of less than 30 amperes in capacity. A discussion of this subject on page 644 will be illuminating to those not already informed on this subject.

THE CAPITALIZATION OF EXCESS EARNINGS.

A decision handed down by the Public Service Commission of Ohio on September 24 and noted in this issue sets an important precedent in the attitude of the Public Service Commission regarding the capitalization of earnings which have been used for the improvement of the property.

The Ohio Traction Company had made use of a portion of its earnings which might otherwise be used for dividends for the purpose of improvements and betterments. Without stating its precise reasons therefor the Commission declares that it finds no sufficient reason for increasing the capital obligations of the company in order to reimburse the income account for these expenditures.

Sufficient details are not given in the decision of the Commission to judge how generally this precedent would apply to other cases which might be somewhat similar in their nature. Two entirely different conditions may be hypothecated in such a case. One is where earnings which might properly be used for reasonable dividends are diverted for the purpose of extending the property and service of the company. This is equivalent to the reinvestment of dividends paid and it would seem to have been proper to issue stock, equivalent thereto in amount, before using the funds for that purpose.

A second case arises where perfectly adequate dividends have already been regularly paid and a surplus remains which may be taken by the Commission to represent the result of excessive rates. This would be analogous to the notorious case of one of the large express companies, whose business has been built up upon a very minute original investment, most of the extensions of equipment and service having been derived from the excessive earnings which have arisen through the existence of a remarkably high schedule of rates and peculiar system of charges.

These two cases should be carefully distinguished. A refusal to permit the issuance of securities in the first case works hardship and an injustice to the investor, who would not otherwise receive a reasonable return. In the second case no such injustice is done and the position taken by the Commission may be defended on the ground that the surplus has arisen through excessive rates in the past and is consequently not entitled to earn returns which would place an additional burden upon the consuming public. We are quite familiar with the practice of distributing dividends in the shape of stock issues among industrial corporations, but it is very questionable whether such a method of procedure is advisable among public-utility companies.

The complete separation of the two functions of the company in issuing stock and paying dividends would prevent the possibility of such cases coming before the Public Service Commission, with the possible embarrassment which might ensue.

Convention Program of American Electric Railway Association.

The program of the thirty-first annual convention of the American Electric Railway Association and affiliated associations to be held at Chicago, October 7 to 11, 1912, will be substantially as published herewith. The afternoons of Tuesday, Wednesday and Thursday of convention week are set apart for the American Association meetings, the remainder of the program being devoted to the meetings of the affiliated associations. All sessions will be held in the rooms of the Saddle & Sirloin Club, adjoining the exhibit hall.

Accountants' Association.

October 7—2 p. m. to 5 p. m.

Annual address of president. Annual report of Executive Committee. Annual report of secretary-treasurer. Address, Mortimer E. Cooley, dean, department of engineering, University of Michigan, Ann Arbor, Mich.

October 8—9:30 a. m. to 12:30.

Reports of the Committee on Interline Accounting, and Committee on Destruction of Records. Address, W. J. Hagenah, public utility statistician, Chicago, Ill.

October 9—9:30 a. m. to 12:30 p. m.

Reports of the Committee on Express and Freight Accounting; Committee on Fares and Transfers; and Committee on Statistical Unit.

October 10—9:30 a. m. to 12:30 p. m.

Reports of the Committee on Engineering Accounting; Committee on Life of Railway Physical Property; Committee on a Standard Classification of Accounts; Committee Representing the Association at Convention of the National Association of Railroad Commissioners; and Committee on Collecting and Accounting for Variable Rates of Fare.

Engineering Association.

October 7—2 p. m. to 5:30 p. m.

Annual address of president. Annual report of Executive Committee. Annual report of secretary-treasurer. Appointment of Convention Committees. Report of Committee on Power Distribution.

October 8—9:30 a. m. to 11 a. m.

Report of Committee on Block Signals. Report of Committee on Train Operation. (Joint session with Transportation & Traffic Association.)

October 9—9:30 a. m. to 1:30 p. m.

Appointment of Committee on Nominations. Reports of the Committee on Buildings and Structures; Committee on Standards; and the Committee on Power Generation.

October 10—9:30 a. m. to 1:30 p. m.

Report of the Committee on Engineering Accounting. Report of the Committee on Railway Physical Property.

October 11—9:30 a. m. to 1:30 p. m.

Reports of the Committee on Heavy Electric Traction; and the Committee on Equipment. Election of officers.

Claim Agents' Association.

October 7—2:30 to 5:30 p. m.

Annual address of president. Annual report of Executive Committee. Annual report of secretary-treasurer. Reports of special committees. Papers—"The Organization, Maintenance and Operation of the Medical Department of a Large Street Railway Company." (a) "Its Relation to the Claim Department," by E. L. Lindemuth, claim agent, Wilkes-Barre Railway Company, Wilkes-Barre, Pa. (b) "Its Attitude Toward the Public," by W. E. Robinson, claim agent, The Cincinnati Traction Company, Cincinnati, Ohio. (c) "Its Attitude Toward the General Practitioner," by C. B. Proctor, claim agent, Memphis Street Railway Company, Memphis, Tenn. (d) "Expert Medical Testimony," by Dr. John P. Moorhead, chief surgeon, Interborough Rapid Transit Company, New York, N. Y. Written discussions—(a) J. S. Harrison, claim agent, Jacksonville Traction Company, Jacksonville, Fla. (b) Wallace Muir, assistant counsel, Kentucy Traction & Terminal Company, Lexington, Ky. (c) Dr. W. M. Holtz, Pittsburg Railways Company, Pittsburg, Pa. (d) S. B. Hare, claim agent, Altoona & Logan Valley Electric Railway Company, Altoona, Pa.

October 8—9:30 a. m. to 1 p. m.

Papers—"What Influence Can the Claim Department Exert in the Prevention of Accidents?" (a) "With the Management," by M. S. Rausch, claim agent, The Milwaukee Electric Railway & Light Company, Milwaukee, Wis. (b) "With the Transportation Department," by Alves Dixon, claim agent, El Paso Electric Railway Company, El Paso, Texas. (c) "What Can Be Done to Inoculate into the Minds of Employes a Strict Adherence to the 'Golden Rule'?" by B. S. Josselyn, president, Portland Railway, Light & Power Company, Portland, Ore. Written discussion—(a) E. C. Carpenter, general manager, Pittsburg & Butler Street Railway Company, Butler, Pa. (b) F. J. Whitehead, manager claim department, Washington Railway & Electric Company, Washington, D. C. (c) S. J. Herrell, claim agent, Knoxville Railway & Light Company, Knoxville, Tenn. General discussion. Address—Dr. W. H. Tolman, director, American Museum of Safety, New York, N. Y.

October 9—9:30 a. m. to 1:30 p. m.

Papers—"The Value of Expert Testimony," by J. L. Quackenbush, claims attorney, Interborough Rapid Transit Company, New York, N. Y. Russell A. Sears, general attorney, Boston Elevated Railway Company, Boston, Mass. Sidney Ossoski, general claim agent, Chicago Railways Co., Chicago, Ill. Written discussions: A. J. Faulkner, Puget Sound Traction, Light & Power Company, Seattle, Wash. L. S. Hoffman, general solicitor, Public Service Railway Company, Newark, N. J. C. G. Brunner, Easton, Pa.

October 10—9:30 a. m. to 1 p. m.

Report of the Committee on Training of Transportation Employes. (Joint session with Transportation & Traffic Association.) Papers—"Education." (a) "Education of Employes," by James R. Pratt, assistant general manager, United Railways & Electric Company of Baltimare, Baltimore, Md. (b) "Education of the Public and the Education of School Children," Frederick S. Hughes, Los Angeles, Cal., illustrated by the stereopticon. Written discussions—(a) John J. Reynolds, claims attorney, Boston Elevated Railway Company, Boston, Mass. (b) J. M. Hone, Inland Empire System, Spokane, Wash. (c) Mrs. Ida P. Newell, Portland Railway, Light & Power Company, Portland, Ore. General discussion. Election of officers.

Transportation and Traffic Association.

October 7—2:30 p. m. to 5.

Annual address of the president. Anual report of the Executive Committee. Annual report of the secretary-treasurer. Reports of Special Committees. Report of Committees on Associate Membership, on Subjects, on City Rules, on Interurban Rules, and on Uniform Definitions.

October 8—9:30 a. m. to 12:30 p. m.

Report of Committee on Block Signals for Electric Railways. Report of Committee on Train Operation.

October 9—9:30 a. m. to 12:30 p. m.

Appointment of Committee on Nominations. Report of Committees on Express and Freight Traffic, on Express and Freight Accounting, on Fares and Transfers, on Statistical Unit.

October 10—9:30 a. m. to 12:30 p. m.

Report of Committee on Training of Transportation Employes. (Joint session with Claim Agents' Association.) Report of Committee on Construction of Schedules and Time-tables. Paper—"One-man Prepayment Car Operation," by S. R. Inch, general manager, Missoula Street Railway Company, Missoula, Mont. Election of officers. Adjournment.

Program of Electric Vehicle Association.

The third annual convention of the Electric Vehicle Association of America will be held in Paul Revere Hall, Mechanics Building, Boston, Mass., October 8 and 9. A private entrance has been provided from Huntington Avenue to the convention headquarters. The annual business meeting and election of officers will take place on the morning of October 8. Reports of committees and the president's address will also be presented at the first session, beginning at 10 a. m.

One afternoon and one evening will be free from business sessions, so that delegates and guests may accept the invitation of the Boston Edison Company to visit the Electrical Show, and participate in the various other entertainments provided by the committee.

The registration fee for guests and non-members will be one dollar, payable at the registration booth.

The following papers will be presented on Tuesday: "Where We Stand Today," by C. E. Michel; "Street and Traffic Conditions as Applied to the Use of Electric Vehicles," by R. McAllister Lloyd; "The Publicity Campaign of the Electric Vehicle Association of America," by Frank W. Smith; "The West as a Field for Electric Vehicles," by M. Ekstromer; "Notes on the Cost of Motor Trucks," by Harold Pender and H. F. Thomson; "Some Recent Developments in the Lead Battery," by Bruce Ford.

On Wednesday the following papers will be presented: "Electric-Vehicle Development in the East," by Stephen J. Thompson; "Electric-Vehicle Charging Apparatus," by R. E. Russell; "Progress of Commercial Cars in America with Special Reference to the Electric," by E. S. Foljambe; "Insurance from the Standpoint of Electric Vehicles," by Carl H. Clark; "The Edison Storage Battery in Service," by H. H. Smith; "Electric-Vehicle Service," by J. C. Ford.

Valuation of Public-Utility Plants.

To better ascertain the values of the properties of the public-utility corporations in San Francisco, Cal., for use as a basis for rate fixing, the Supervisors have adopted a resolution providing for the appointment of a "Valuation Committee."

R. F. Pack.

One of the most interestng central-station developments in the last few years has been the purchase of the properties of the Minneapolis General Electric Company by the interests controlled by H. M. Byllesby & Company. This great organization has been growing in importance, in its management of progressive and successful central-station properties in many parts of the country and its acquisition of the Minneapolis central station assures a rapid development of probably one of the most fertile fields for work of this kind. The Byllesby organization is manned by men of more than ordinary ability, and to be associated with this organization is at once the hall mark of wide experience and demonstrated capacity for hard work, good service and mastery of executive detail.

R. F. Pack,
General Manager, Minneapolis General Electric Company.

The appointment of Robert F. Pack as general manager of the Minneapolis General Electric Company, is a well merited recognition of his high attainments. Mr. Pack was born in England in 1874. He was educated for the British Navy, but came with his parents to Canada at an early age. Twenty-one years ago he entered the service of the Toronto Electric Light Company as an office boy. He advanced steadily to the positions of accountant, comptroller, secretary and finally general manager of one of the largest of the Canadian electric companies, serving a population of about 450,000. He is ranked among the most progressive of utility managers.

Mr. Pack is president of the Canadian Electrical Association and a member of the executive committee of the National Electric Light Association. He has also served upon various committees. He is a member of the American Institute of Electrical Engineers, of the Engineers Club of New York, Engineers Club of Toronto, Royal Canadian Yacht Club, Arts and Letters Club and Albany Club of Toronto. He was for some time a member of the publicity committee of the Toronto Board of Trade.

Second Reunion of the Telephone Pioneers.

The second annual meeting of the Telephone Pioneers of America is to be held at the Hotel Astor, New York City, November 14 and 15. The first day will be given up to a general business meeting. There will be addresses in the morning by U. N. Bethell and Thomas A. Watson and in the afternoon by others. In the evening a reception will be given to the Pioneers by the New York Telephone Society.

The second day will be devoted to an automobile ride of considerable length, with lunch at one of the prominent clubs in the suburbs. In the evening there will be a banquet.

The full program will be completed at a meeting of the General Committee of Arrangements, which is to be held on October 15. The president of the Telephone Pioneers is Theodore N. Vail and the secretary is Henry W. Pope, 26 Cortlandt Street, New York City.

Slogan Sign in Galveston.

The City of Galveston, Tex., has been presented with an immense electric sign by the Brush Electric Company, the dedication taking place on September 28. The sign is 65 feet high and 56 feet wide. It contains 5,000 tungsten lamps, clear and colored, which will flash out to sea the slogan, "Galveston, the Treasure Island of America: Port and Playground Growing Grander, Greater." A border of rope, with a ship's capstan and anchor, burns continuously, while the words are flashed. The letters in the word Galveston are seven feet high. The sign cost about $10,000.

Convention of Iron and Steel Electrical Engineers.

The Association of Iron and Steel Electrical Engineers held its annual convention this week at Milwaukee, Wis., headquarters being at the Hotel Pfister. The attendance was good and was somewhat augmented on account of the simultaneous meeting of the Co-operative Safety Congress at the same place, some of the sessions being held jointly. The two bodies held a joint banquet on Monday evening, at which, in addition to the speeches, some vaudeville acts were presented.

On Monday morning an executive session was held and in the afternoon papers were presented by A. E. Handy on "Blast-Furnace Tops," by E. D. Dickinson on "Mixed-Pressure Turbines," and by Wilfred Sykes on "Power Problems in Steel Mills."

On Tuesday morning the first paper presented was by E. J. Cheney on "Automatic Speed-Regulating Equipment for Induction motors with Flywheels." This was discussed by B. G. Beck, F. P. Townsend, Wilfred Sykes, E. Friedlander, James Fairington, J. H. Wilson, T. E. Tynes, L. R. Rankin, C. E. Bedell, C. W. Parkhurst, F. D. Egan and B. R. Shover.

The next paper was by R. B. Treat and was entitled "Direct-Current Motor Field Coils." This was discussed by F. D. Egan, C. W. Parkhurst, Brent Wiley, C. E. Bedell, M. A. Whiting and T. E. Tynes.

C. J. Mundo then presented a paper entitled "Curves and Data for Illumination Calculations." This was discussed by B. W. Gilson, Ward Harrison, James Fairington, J. H. Wilson, H. M. Gassman, and C. W. Parkhurst. The latter and President Shover both praised the work which Mr. Mundo has done in improving mill lighting and a vote of thanks to him was unanimously passed.

At the session on Tuesday afternoon J. F. Lincoln read a paper on "Arc Welding." This was followed by a paper entitled "The Accomplishments and Possibilities of Oxy-Acetylene Process," by M. S. Plumley, which was presented by J. M. Morehead. The two papers were discussed together, the following participating: R. F. Patterson, E. Friedlander, B. W. Gibson, Brent Tynes, W. T. Snyder, C. A. Kafer, C. Pirtle, Wilfred Sykes, J. C. Reed, M. A. Whiting, F. R. Fishback, George Hills.

C. T. Henderson, chairman of the Entertainment Committee, was then presented by the other members of the committee with a clock as a token of their appreciation of the work which he had done.

The final paper of the session was by Ward Harrison and was entitled "The Incandescent Lamp in the Steel Industry." This was discussed by James Fairington, T. E. Tynes, H. M. Gassman, L. S. Iremouger, C. J. Mundo and F. W. Stevens.

On Wednesday the members attended the automobile races and no sessions were held, the other paper scheduled for Wednesday being postponed to the session on Thursday morning. A full report of the papers and discussions will be found in our next issue.

Thirty Years of Electrical Journalism.

One of the most interesting incidents of the current month is the commemoration by the New York Edison Company of the anniversary of its 30 years of electrical service in the City of New York. The great exposition conducted at the New York Electrical Show, which will be held at Grand Central Palace from October 9 to 19, and

Comparative Sizes of Volumes for the Year 1882 and for the First Six Months of 1912.

concerning which we have more to say on other pages of this issue, will form an interesting commentary regarding what has been done in things electrical during the past 30 years.

In this connection, it is interesting to note that in February of this year the ELECTRICAL REVIEW completed 30 years of publishing life. This journal, ever an exponent of development in the electrical field, and devoted consistently to the centralization of power supply, as exemplified by central stations all over this broad land, has kept in close touch with these expanding relations and consequent changes in the industry.

The ELECTRICAL REVIEW made its first appearance February 15, 1882. At that time it was named *The Review of the Telephone and the Telegraph.* It was published semi-monthly, under this title, for one year, when the name was changed to ELECTRICAL REVIEW. Thereafter it was published as a weekly journal, the first weekly devoted to electricity to be established in America. The growth in the contents of the publication is graphically shown by the accompanying illustration. The volume for the whole year of 1882 comprised 416 reading pages; the volume for the first half, of six months, of 1912 comprised 1,280 reading pages.

As the electrical industry has broadened in its possibilities, the ELECTRICAL REVIEW has increased its editorial staff and the range of its contributions, so that every phase of electrical development would be adequately handled. In line with this policy, the ELECTRICAL REVIEW in November, 1908, absorbed the *Western Electrician*, founded in July, 1887, and published at Chicago. At the time of the consolidation the publication offices of the ELECTRICAL REVIEW were moved to Chicago. On January 1, 1912, the influence and range of service of the publication were still further increased by consolidating with it *Electrocraft*, the leading exponent of the electrical contracting industry, founded in Detroit in October, 1905.

Quebec Electrical Association.

Members of the Electrical Association of the Province of Quebec held the opening meeting of the season on Thursday, September 12, at the Edinburgh Cafe, Montreal, Clarence Thomson presiding. Practically the whole of the evening was spent in discussing means to augment the membership and to improve the attendance at the meetings. The balance of opinion was in favor of developing the society by means of the weekly luncheons and by securing prominent speakers on general and interesting topics. It was stated there was a difficulty in securing adequate attendance at the monthly meetings, and as a result of the discussion a committee, consisting of Messrs. McGregor, Lachapelle, Smith, Parsons and Duncan, was appointed to revise the constitution by changing the monthly to annual meetings, and investing the Executive Committee with business powers. The report of the Committee will be discussed at the next monthly meeting.

To Remove Poles in Philadelphia.

An effort will be made to provide funds for the removal of all city poles in Philadelphia, carrying electric wires within the near future. For this purpose an appropriation of $80,000 will be asked for next year and a policy adopted of putting all extensions of the present fire and police telegraph system underground. The administration is also considering the advisability of preventing the erection of additional poles by corporations and requiring that those now standing be removed.

Electricity in Paint and Varnish Plants.

A motor load like that of a paint factory which is made up of many long-hour grinding operations is desirable business for the central-station company as well as the customer. This article shows how central-station power has effected savings in several plants and gives complete operating data on four typical establishments.

As is true in a great many industries, the use of central-station service is making rapid advances in plants devoted to the manufacture of paints and varnishes, as the innumerable advantages of electricity over mechanical operation are becoming universally recognized. A motor load like that of a paint factory which is made up of many long-hour grinding operations, is desirable business for the central-station company as well as the customer. The latter avoids the trouble and up-keep of an isolated plant, and enjoys the advantages of operating any part of his factory overtime without the expense of running the whole power plant. On the other hand, the continuous grinding and mixing processes involved in paint making insure a good load-factor for the central station.

Before dealing narrowly with the equipment in a typical establishment devoted to the manufacture of paints and varnishes, it may be of interest to comment rather fully on an extensive report submitted by a central-station company to a large paint factory, analyzing operating conditions under the old method and conditions after the proposed installation of motors is made. Incidentally, it might be said that the report was favorably received, and the central station in question is now supplying power to this plant.

The first item considered is that of cost. The initial cost of a generating equipment usually calls for a considerable outlay. In the case under consideration the cost was in excess of $21,000, and carried with it an interest charge of five per cent, aggregating more than $1,000 annually. Central-station service would cut this item of expense out entirely, and if originally adopted would have released $21,000 of capital to manufacturing uses where it could earn two or three times this interest charge.

The second item discussed is depreciation and maintenance. These two items of expense are usually associated and used more or less as interchangeable terms, but they are not such. It is important to define them in the sense in which they shall hereafter be referred to. Maintenance covers the cost of repairing the machines and keeping them in good running order. There comes, however, a time with every machine when it is impossible to operate usefully no matter how much is spent in maintaining

Group of Motor-Driven Paint Mills in Pittsburgh Plant.

its running condition. The machinery must then be thrown away. Its value is gone, and its cost price has vanished and so much capital is lost. The sum of money so destroyed is the total depreciation of a machine, and if this sum be divided by the number of years of life of a machine the amount so obtained is the annual depreciation of the machine. It is usual to express it in per cent. Thus a small automatic high-speed engine has a life of about ten years, and the depreciation is therefore ten per cent. After this time its moving parts and wearing surfaces have to be replaced or renewed, and the cost of so doing is practically equivalent to buying a new engine. With any type of machine its term of useful years is approximately fixed by the treatment of the machine by its successive operators. An engine or generator that has been carelessly handled may have its life cut down from a period of say 15 years to 10 or even five. It depends entirely upon the care given to the machine and the skill of its operators. Both of these uncertain and costly items are obviated by purchasing central-station power.

Capacity is the third item discussed. In taking energy from a central station you take just what is needed, whether it is far under normal manufacturing demand or above it. With an isolated plant it is impossible to go far over the capacity of the machines installed without subjecting them to undue strains, and further it is impossible to go far below the capacity of the equipment installed without generating in a wasteful manner. In the particular plant under discussion the engine was working at about one-fifth of its load capacity, with resultant uneconomical operation. In fact, the engines used about twice as much steam for each horsepower developed as they would when operating under full-load conditions.

Regarding reliability, when central-station energy is used the possibilities of interruption to power service by strike of engineers or firemen, their injury or sickness, a failure of coal supply, or the flooding of engine room, is very remote. Also, where only one engine is used a breakdown on this will mean the closing down of the entire plant with the resultant loss of production. In the case under discussion, which is typical of average conditions, two shutdowns had occurred just previous to the substitution of central-station power.

The fifth item is that of labor. The class of attendance that can be obtained in the open market for a factory power plant is an uncertain quantity. Even when it is honest and well-meaning it is not able to meet all emergencies. A man may be good at boiler work or at engine work, or at generator work, depending on where he began to learn the trade of engine runner. It is seldom, however, that he is thoroughly familiar with all types and competent to repair them. In addition, when using central-station service, the management is relieved of the care and attention always required in the purchasing of supplies, and the work and attention necessary to a competent system of bookkeeping.

As to actual cost data in this plant, the following figures were compiled:

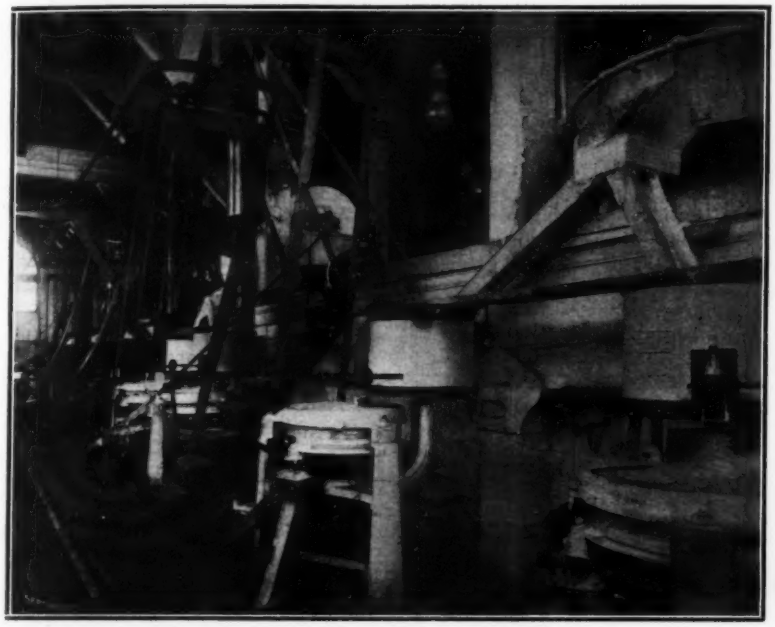
Machine foundations	$ 890.88
1 350-horsepower Franklin water-tube boiler exclusive of foundation	4,100.00
1 350-horsepower Heine water-tube boiler exclusive of foundation	4,200.00
1 Cochrane Feed-water heater with oil-separating attachment, including freight and installation	1,215.00
1 Epping-Carpenter duplex steam pump, installed	121.00
1 350-horsepower Buckeye engine direct-connected to one 200-kilowatt generator with switchboard and exciter, exclusive of foundation, but including freight and installation	6,545.00
1 Epping-Carpenter duplex steam pump including installation	285.00
Pipe and fittings in boiler-room	582.39
Pipe and fittings for steam auxiliaries in engine room including installation	3,912.26
Total cost	$21,851.53

From this estimate is omitted the cost of fire-pump, service-pump, centrifugal-pump, the cost of flooring in engine room, a proportionate cost of walling off of boiler and engine room, and the excessive cost of chimney over that required for merely heating the building. These items would add another $1,000 to the amount computed. The operating costs of this power plant were divided into two parts: (1) fixed charges, under which come (a) interest on investment, (b) depreciation, and (c) taxes and insurance, and (2) running expense, under which come (a) labor and attendance (b) fuel and water, (c) oil waste and supplies, and (d) repairs and maintenance. Under the first division, (a) the investment in this plant is $21,851, and at five per cent the annual interest charge is $1,092.55. (b) The usual rate of depreciation for a plant of this character is 10 per cent, which is an average covering all of the different pieces of machinery. After a thorough study of the equipment, however, seven per cent was adopted in reckoning the depreciation, which amounted to $1,529.57. (c) Assuming taxes and insurance at a rate of two

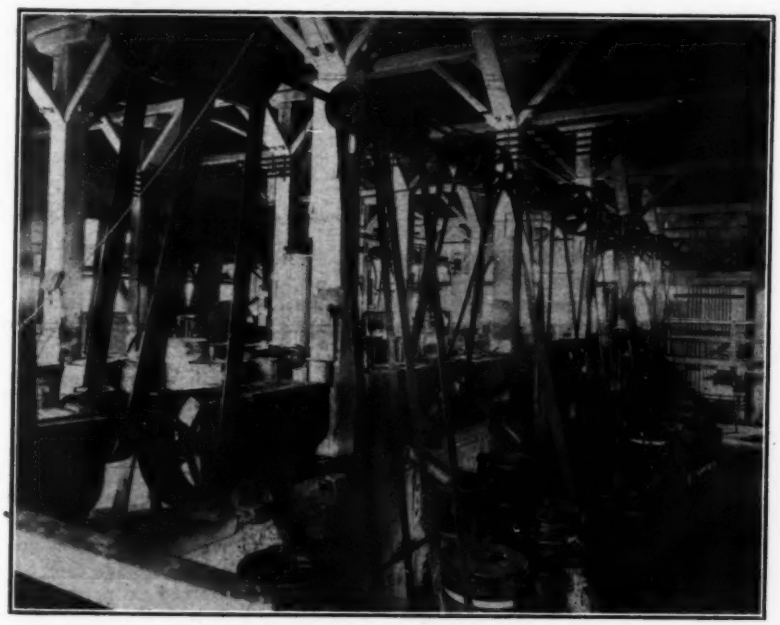
Motor-Driven Chaser.

Group of Paint Mills and Mixers.

per cent on three-quarters of the valuation, namely, $15,000.00, this figures out at $300.00. Other items such as a proportionate rent charge for the power house and floor space, superintendence of the plant and similar charges were omitted. Under running expenses the first item (a) labor and attendance, consists of one engineer at $25.00 per week, one fireman at $15.00 per week, and the part time service of an elderly mechanic who helps in the engine room. The weekly charge is therefore $40.00, and the annual cost $2,080.00. (b) The coal bill for a year was $1,980.44, and the water charge $40.18. This idea does not take into consideration, however, the costs of supplying water from the company's own well. The cost of oil and waste used in the engine room amounts to $42.47 for the former and $60.81 for the latter. Engine-room repairs amount to $450.50, and $49.43 was the cost of boiler compound used during the year. The itemized costs, therefore, are as given in the next column.



Motor-Driven Paint Mills in Pittsburgh Plant.



Motor-Driven Mills and Mixers.

Depreciation at seven per cent on investment of $21,851.00	$1,529.57
Interest at five per cent on investment of $21,851.00	1,092.55
Taxes and insurance at two per cent on three-quarter value	300.00
Labor and attendance	2,080.00
Coal	1,980.44
Water	40.18
Lubricating oil	42.47
Waste	60.81
Supplies	450.50
Boiler compound	49.43
Total cost of operation per year	$7,625.95

The cost of operation per month is therefore $635.49. Check meters installed in this plant showed a monthly use of 16,600 kilowatt-hours. The central station offers a rate of two cents per kilowatt-hour, which would make the power bill for central-station energy so purchased, $332 per month, a saving of $1,620.60 annually. This is figured on the basis of operating the boiler plant for heating purposes and for generating the steam necessary in the various manufacturing operations. The cost of steam operation under this plan would be:

Boiler depreciation and interest at 10 per cent	$420.00
Coal for heating	496.08
Coal for elevators	167.25
One fireman with engineer's license	900.00
Oil	8.00
Waste	10.00
Water	20.00
Total	$2,021.33

If the elevators were changed to electric drive and electrically operated service and oil pumps were installed, the cost of energy from the central station would be two cents per kilowatt-hour and the various monthly bills would be approximately as follows:

Motor cost	$332.00
Elevators	15.00
Pumps	8.00
Total energy cost	$355.00

The heating of the buildings by low-pressure steam from one of the present boilers would then be as follows:

Boiler, interest and depreciation at ten per cent	$420.00
Coal	496.08
Fireman	600.00
Total	$1,516.08

This would mean a saving of $1,849.95 annually.

A plant at present using central-station energy that exemplifies operating conditions in a typical establishment devoted to the manufacture of paints and varnishes is that of the Louisville Lead & Color Company, Louisville, Ky., which purchases power for all of its requirements from the Louisville Lighting Company. The cost of operating this plant so far has been practically the same as the cost of running the steam plant which was in operation up to about two years ago. However, the management figures that the reliability of the service and freedom from necessary attendance, etc., is sufficient reason for desiring to continue central-station service.

There was originally installed in this plant a 250-horsepower Skinner engine, direct-connected to a 125-kilowatt, 220-volt, direct-connected generator running at 200 revolutions per minute. When the plant was changed over to central-station service it was decided that for the present greater economy could be effected by installing a motor-generator set and generating direct-current for the motors installed, than by re-equipping the entire plant for alternating-current service. A 135-horsepower, 2,200-volt, two-phase synchronous motor with self-contained exciter was, therefore, installed, driving a 220-volt, direct-current generator at 900 revolutions per minute.

The Louisville Lead & Color Company's plant is a model one in every respect. The average weekly output with the equipment at present installed is about 3,500 gallons of mixed paints and 12 tons of leads. In the paint manufacturing operations advantage is taken of gravity routing to convey the products under processes of manufacture from one machine to another, the raw material starting on the top floor and finding its way down, story by story, until at the bottom it is ready for kegging. The crude stock is delivered to the factory from cars on the company's private switching tracks and raised by two 10-horsepower electric elevators to the desired floor level. Liquids are elevated to storage tanks on the top floor by means of a 12-inch centrifugal pump; oils, varnishes, turpentine and other materials being handled by this same pump.

On the top floor the dry ingredients of the paint body, with the necessary oils, dryers, etc., are thoroughly mixed together by large motor-driven chasers. These chasers consist of large circular pans, around which huge solid-iron wheels and paddles slowly rotate. These machines accomplish thorough mixing of the paint ingredients before the latter are delivered to the grinding mills below. In the plant in question a 25-horsepower shunt-wound motor, operating at 450 revolutions per minute, is geared to a horizontal shaft operating at 50 revolutions per minute which drives five 72-inch chasers. Clutches are arranged so that any chaser can be started or stopped without interfering with the operation of the others. In the type of paint mixer used in this plant, rotating paddles are relied upon to effect a thorough incorporation of the paint ingredients. The arrangement of the paddles or rakes is such that the material is continually worked over from the top and bottom of the pans. Some of these mixers are steam jacketed, keeping the material warm during manipulation. A 25-horsepower motor running at 950 revolutions per minute is belted to a line shaft driving four 8-inch and six floor-type mixers, which are used for compounding special batch mixtures.

From the mixing floor the material drops through gates to the grinding machines on the floor below. These grinders are of three types; roller mills, burr or stone mills and iron mills. In the former, three 14-inch rollers geared to revolve at increasing speeds from the first to the third, are mounted in a row. In passing between either pair of rolls, one member of which is revolving at higher speed than the other, a combined crushing and grinding action is given the paint material. This grinding is further effected by arranging one or more of the rolls with a cam motion to give a sidewise movement, which also aids in distributing the material on the rollers. In the burr and iron mills, flat grinding surfaces of stone-to-stone or metal-to-metal, as the case may be, reduce the material to a finely ground condition.

After being thoroughly ground if the paint body is to be made up into ready-mixed paints, it is dropped from the grinding mills into large mixing tanks on the floor below, where the liquid solvents are added and the whole mass thoroughly stirred into intimate mixture by powerful paddles.

The total connected horsepower in this plant is 284.5. This is made up of 19 shunt-wound direct-current motors, seven of which are used for the various paint mills and mixers mentioned. Eight 10-horsepower motors and three 7.5-horsepower motors operate elevators in this plant, and one 2-horsepower motor, operating at 1,800 revolutions per minute, drives a printing press used for printing labels used in the plant.

The following table gives a list of additional machines found in paint and varnish plants and shows the horsepower required for each.

Group of Motor-Driven Grinders in Denver Plant.

Group of Motor-Driven Mixers in Denver Plant.

Machine.	Horsepower.
Paint grinders	3 to 15
Screen and conveyor	5
Water mill for lead grinding	35
Oil mill for lead grinding	20
Shaker and mixer	3
Putty cleaner	10
Packer	7.5
Lead pulverizer	2 to 10
Mixing tanks	3
Lead roll	10
Buckle machine	5
Large mineral paint grinder	20

The manufacture of paints and varnishes for dry climate, such as exists in Denver and surrounding territory, requires a special treatment. A description of a Denver plant may, therefore, be of interest.

The McMurtry Manufacturing Company has been operating a paint and varnish factory in Denver for a number of years. Two years ago they completed a reinforced concrete steel structure consisting of three floors and basement 50 feet by 125 feet. The machinery is operated in group and individual motor drives with a total of 120 horsepower for the manufacture of paints. In the past year they have completed a new additional structure, 50 feet by 100 feet, for the manufac-

(Continued on page 636)

Paint and Varnish Plants.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for 24 hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

T. H. Nevin Paint Company, Pittsburgh, Pa. This company has an average output of 1,000 gallons of paint per day and does a business of $300,000 per year. Combination drive.

Total connected horsepower, 85. Number of motors, 5. Average kilowatt-hours per month, 16,263.

Kilowatt-hour consumption for 10 months: January, 13,020; February, 9,810; March, 8,000; April 11,690; May, 18,590; June, 20,480; July, 20,790; August, 25,610; September, 17,300; October, 17,340.

Load-factor, 35 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60-cycles, 220 volts.

No.	Horse-power.	Speed, R. P. M.	Application.
1	15	850	Belted to a line shaft driving two putty chasers.
1	20	850	Belted to a line shaft driving five paint mixers, and five paste mixers.
1	20	850	Belted to a line shaft driving five paint mixers; seven 16-inch stones; two large chasers; and four 30-inch stones.
1	25	1,120	Belted to a line shaft driving one double run of stones; one single run of stones; and four paste mixers.
1	5	1,700	Geared direct elevator.

Energy is supplied by the Allegheny County Light Company.

Paint and putty company, does a business of about $52,000 per year in paints and putty. Has an output of 3,000 pounds of putty and 7,000 pounds of paint per day. There are six men employed working 10 hours per day.

Total connected horsepower, 30. One squirrel-cage induction motor is installed. Average kilowatt-hours per month, 1,019.

Kilowatt-hour consumption for 12 months: July, 847; August, 882; September, 824; October, 951; November, 1,124; December, 1,070; January, 770; February, 1,117; March, 1,451; April, 1,341; May, 1,321; June, 540.

Load-factor, 6.2 per cent; operating-time load-factor, 15.4 per cent.

The approximate electrical energy-consumption per ton of paint and putty manufactured is 8 kilowatt-hours.

MOTOR INSTALLATION.

No.	Horse-power.	Speed, R. P. M.	Application.
1	30	850	Belted to a 15-foot shaft (four hangers) with 27 feet of countershafting, driving three 16-inch stone mills for grinding paints; two paint Chaser mills; one 36-inch stone mill; one 20-inch stone mill; one 15-gallon paint mixer; one 40-gallon paint mixer; four agitating tanks of 35 gallons capacity each; one 5-gallon iron mill; one can-seaming machine.

Peaslee-Gaulbert Paint Company, Louisville, Ky. This plant has an output of about 3,500 gallons of mixed paints and 12 tons of leads per week.

Total connected horsepower, 262. Number of motors, 16. Average kilowatt-hours per month, 11,769.

Kilowatt-hour consumption for 12 months: March, 13,728; April, 11,568; May, 12,432; June, 11,856; July, 7,536; August 8,004; September, 11,924; October, 14,544; November, 12,768; December, 9,320; January, 14,928; February, 12,624.

Load-factor, 10.2 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is 220 volts, direct current.

No.	Horse-power.	Speed, R. P. M.	Application.
1	25	450	Geared to line shaft driving five 72-inch chasers.
1	25	950	Belted to a line shaft driving four 48-inch mixers; and six floor-type mixers.
1	25	450	Belted to a line shaft driving six roller mills; and six burr mills.
1	25	450	Each geared to a line shaft driving four 30-inch burr mills; and three 20-inch mills.
1	22	950	Belted to shafting driving five 20-inch burr mills; two 18-inch burr mills; eleven 15-inch burr mills; eleven 12-inch iron mills; 30 150-gallon vertical mixers; and four 450-gallon horizontal mixers.
2	20	550	Belted to putty mills.
1	2	1,800	Belted to shaft driving two small printing presses.
8	10	.....	Each direct-connected to elevator mechanism.

Energy is supplied by the Louisville Lighting Company.

ture of varnishes. Fourteen and one-half horsepower individual and group driven motors are required in this building. In the paint manufactory the white lead and oil are lifted to the third floor of the larger structure by means of an electric elevator, requiring a 10-horsepower, 220-volt, three-phase motor. A 35-horsepower, 220-volt, three-phase motor on this third floor drives 13 mixing machines, 30 inches in diameter by 24 inches high, also four ponies. After the white lead and oil have been thoroughly mixed they are deposited into machines on the second floor by gravity through iron chutes. The mixture is run through grinders of the burr type. A 20-horsepower, 220-volt, three-phase motor drives a line shaft to which is attached four 20-inch burrs, two 30-inch burrs and three 26-inch burrs. A 20-horsepower, 220-volt, three-phase motor also drives a line shaft to which is connected four 30-inch burrs; three 26-inch burrs and four iron mills. Also a 10-horsepower, 220-volt, three-phase motor drives seven 20-inch burr mills by line shaft.

The product is then deposited by gravity again through iron chutes to the first floor, where it is run through agitators and tinted to the various colors. A 7.5-horsepower, 220-volt, three-phase motor drives by line shaft five 36 by 26-inch agitators and two goose necks, the latter being portable. Another 7.5-horsepower, 220-volt, three-phase motor on the first floor drive nine agitators, 36 by 36-inch. There is also on this first floor a 10-horsepower, 220-volt, three-phase motor which drives a putty chaser having a capacity of two tons per day.

The varnish department, after boiling and cooking the varnish, pumps it into various tanks inside of the building, using four one-horsepower, 220-volt, three-phase motors direct-connected to Gould rotary pumps especially designed for speed for this purpose. These pumps handle varnish, oil and other liquids. On the second floor is a three-horsepower, 220-volt, three-phase motor which drives a varnish separator at 6,000 revolutions per minute, which separates all dirt and sediment from the varnish. It also drives a shellac cutter which is a cylindrical tank or barrel with fingers or cutters inside, rotating at a speed of 200 revolutions per minute. It also drives an agitator. A 7.5-horsepower motor is used for an electric elevator carrying passengers and material to the upper floors.

This factory turns out excellent high quality material especially adapted for this climate and for any other climate. The very best and up-to-date methods are used and their product gives entire satisfaction. Energy is supplied by the Denver Gas & Electric Light Company. Additional operating data are given in the data sheet.

Commercial Practice
Management, Rates, New Business

AM I A COMPETENT POWER SOLICITOR, AND IF NOT, HOW CAN I BECOME ONE?

By R. A. McNally.

The rapidity with which the field covering the use of electricity as a means of power on the farm has broadened out, and the alarming lack of competent power solicitors, for this wonderfully interesting work, has been the means of causing no little concern on the part of the manager of the new-business department.

The fact of the matter is that there is not a lack of solicitors, but rather a lack on the part of the solicitor as to the importance of the work which he is doing, in its relation to the ultimate success of this field.

This condition is due to a number of causes, mainly the fact that the solicitor is not sufficiently informed in his work to create the enthusiasm that this field demands. It will also be found that in a great many cases that the company for whom he is working has made little or no effort to aid him in acquiring a knowledge of his work that will be conducive to a greater activity on his part in the education of the farmer to the use of electricity.

This end cannot be accomplished in a day, but the sooner the new-business manager realizes that the success of this field depends in a great measure upon his solicitors, and places at their disposal all the information and data that he can secure, just so soon will his new-business reports begin to grow.

It is not my intention to even attempt to advise the new-business manager as to the how he should proceed in the education of his soliciting force, but to simply outline for the solicitor himself a general idea of the characteristics and attainments which go to make up a successful power solicitor.

These suggestions and ideas are based on my own personal observations of a number of power solicitors with whom I have come in contact, and who are making a great success of this particular branch of the power industry. However, this article is open to criticism, and if it demands a sufficient amount of interest on the part of my readers, to invoke such criticism, I shall feel that my efforts have not been in vain, for it is to arouse the attention and interest of the solicitors in this question of incompetency on their part, with the hope that they will profit to some extent at least, through my suggestions, that this article is written.

My own experience in the selling end of the electrical game has taught me that first of all a solicitor should have five fundamental qualities, each dependent upon the other, before he even considers the undertaking of power soliciting in the farming districts.

The first is neatness. This does not mean elaborate or expensive clothes, but just the opposite, an ability to dress simply, keep yourself tidy and well groomed. Clothes do not make the man, but they certainly help out.

The second is personality. By this I mean an ever-ready smile and cheerful word, an ability to create a bond of sympathy and a feeling of confidence, between yourself and your prospect, in the first words with which you greet him.

The third is enthusiasm. Let this great factor in the selling game enter into your work with all the force at your command. Take a dose of it morning, noon and night, and then throw in a few extra doses for good measure. It is the most contagious disease known in the annals of the power game, so scatter it wherever you go. One-half of your success lies in this asset alone, but remember to curb it just enough, so that no rash promises are made to the prospect which your company cannot make good. A broken promise breeds dis-

trust, and it's confidence you are striving for.

The fourth is patience. There is but one explanation of this asset, "If you don't succeed at first, try, try again." Perseverance will win out in the end.

The fifth is a thorough knowledge of the work which you are doing. This fifth and last asset is the greatest of all, and I cannot impress too strongly upon the solicitor the absolute necessity of equipping himself with every atom of data that he can absorb. There is an abundance of such data available, and there can be no excuse for the man who fails to take advantage of the many opportunities that are offered to him, through the medium of the great number of splendid articles that are being published, not only in this magazine, but in almost every leading magazine to gain that knowledge of this particular branch of the power industry, which is so essential to his ultimate success.

Granting that the solicitor is gifted with these talents as outlined above, the question now arises as to what constitutes a knowledge conducive to successful solicitation on the part of the solicitor in the farming community, to the end of educating the farmer to the use of electricity as a means of power for irrigating purposes.

There are so many answers to this question that I am simply going to answer it by referring the solicitor to the various sources from which he can secure the necessary data which will permit him to define the farmers' needs in a manner intelligent both to himself and to the farmer.

He must first familiarize himself with a knowledge of the soils in his territory, the amount of irrigation necessary for the various crops common to the locality, the revenue derived from these crops, and the average cost of planting same. With the exception of the first named, the solicitor can secure this data from the farmer himself, and the data required with reference to the soil can be secured from the State Agricultural Board.

After determining the acreage to be put under irrigation, and having equipped himself with the information as outlined above, the solicitor must next familiarize himself with the type of pump best adapted to his territory. Any pump company will gladly supply you with all the data needed, for you need only know the capacity of the various sized pumps, as to the number of gallons it will develop per hour, and the horsepower required per foot of lift. It is best to have a small table giving this data, which can be conveniently carried in your pocket.

Knowing the acreage to be irrigated, the crop to be raised, the amount of water it will require per irrigation, it will be a very simple matter for the solicitor, with his additional data on pumps and motors, to sit down and plan the proper unit which his prospect should install. He can also give him a very close estimate as to what it will cost to irrigate per year, for this is the most important feature of the whole outlay to the farmer.

There are so many bad featuers about a gas engine that I will not attempt to outline any arguments against such an installation. If the solicitor will only put plenty of ginger into his talk with the farmer, and convince him that he is as much interested in helping the farmer to plan his installation as the farmer himself, he will have no need to fear the engine. It is the kick which you put into your argument that wins the prospect over, not the knocking of the other fellow's plant.

Another factor in this selling game which I have not mentioned is the ability to converse well. Don't use big technical words, which you don't understand yourself, but get right down to plain everyday facts, and give them to your prospect in as concise a manner as possible. His time is valuable and so is yours, and a long-winded talk brings few good results.

For snappy arguments and splendid motor talks, I would refer the solicitor to "The Electrical Solicitor's Handbook," which I believe to be the finest book of its kind on the market.

To attempt to go into this selling game at any greater length than I have would entail an atricle too long to warrant its publication in this magazine, so I have only endeavored to give a general outline of the manner in which a solicitor may equip himself, so as to give the best that is in him to the company for which he is working.

As a closing word, I will state that the relation of the position of power solicitor to the power company is just as important as that of the president, and it is even more so in this irrigating field, for the bulk of the ultimate success of this field lies with the solicitor alone.

New Rate in Boston.

The Edison Electric Illuminating Company of Boston announces a new rate, beginning October 1 for electricity used in charging electric truck and automobile batteries, which will be of great advantage to private garages, enabling owners of electric vehicles to greatly reduce their operating costs. The new rate is 3 cents per kilowatt-hour for electricity furnished after the first 20 kilowatt-hours have been consumed per month at the present rate of 10 cents. This rate also applies to charging storage batteries, to cooking, heating, electroplating, refrigeration, water supply and irrigation.

A Successful Demonstration.

Friendly relations and a spirit of good fellowship for a bigger and better future among local contractors, was well demonstrated when the new-business departments of the Peoples Water & Light Company, and the Harrisburg Electric Company joined hands in an electric cooking and heating display and demonstration, at the Saline County Fair, held at Harrisburg, Ill., September 10 to 14.

A large tent was erected opposite the grand stand and close to the band pavilion, under a group of shade trees; a most desirable location, due to the courtesy of the fair officials, the only stipulation being that no goods be sold on the grounds.

The principal attraction was a sewing machine equipped with an Emerson motor outfit, and this household necessity was kept in operation the greater part of the time. One side of the booth was given over to demonstration, toasters, frying pans and irons. A slice of warm toast was served to anyone interested. A cigar lighter hanging in front, in easy reach, reminded the men that matches were no longer required in the well equipped smoking room. A large counter placed across the front, was filled with almost every kind of electrical contrivances, from a curling iron to a vacuum cleaner. A table on the other side was filled with motors of various sizes and designs, also a blacksmith's forge blower. A string of tungsten and carbon lamps of various sizes gave people a chance to compare the filaments of the two.

Those in charge of the display were surprised to find the number of out-of-town people interested, and most of them lived in small towns without day current. One woman remarked that she would not do without her electric iron, although she did have to iron after supper.

As there were thousands of people on the grounds daily and the expenses of the undertaking so small, it was considered a great success as an advertisement—the first of its kind attempted there. If plans do not fail, it will be continued next year.

Progress in Bridgeport.

The United Illuminating Company, of Bridgeport, Conn., carried on during the past summer a three months' wiring campaign on old houses. In this time, several hundred old houses were wired, the owners showing eagerness to avail themselves of the rate made, which was $2.50 per outlet. A minimum of 10 outlets was required. The increasing load of this company in its Bridgeport district has necessitated an almost yearly increase in the capacity of its plants at that place.

Spectacular Electric Sign in Louisville.

The factory of the National Tobacco Company, of Louisville, Ky., producing Tuxedo and a number of other brands of tobacco, has been at Eighteenth Street and Broadway as long as the oldest inhabitant can remember. It is only recently that a big electrical improvement has been made in the tobacco plant which represents an important unit of Louisville's industries. On the roof of the National quarters there is now a mammoth electric sign, supplied with current by the Kentucky Electric Company, and blazing forth the merits of "Tuxedo" to the entire city. Because of the peculiar position of the sign, westward upon a prominent thoroughfare and visible from a half a dozen busy car lines to the north, it boasts advantages which few other advertisers of its type in the city possess. The sign is 63 feet long and 55 feet high, containing 2,600 incandescents, about 600 of which are brightly colored. A burning pipe and cigarette, crossed, form the escutcheon beneath the can of Tuxedo tobacco which is outlined, and the toys of Lady Nicotine smoulder away night after night, giving off clouds of the blue smoke in very realistic fashion. Patrick Hanlon, manager of the National works, is willing to back the new sign against any in the United States as an efficient advertiser, considering the amount of expense incurred.

R. L. Lindsey.

For a long time there existed among central stations a rather general lack of appreciation of the necessity of a well defined public policy in the management of the central-station business, and of the worth to such a business of an aggressive man having correct ideas and sound judgment in matters pertaining to the relations of the public-utility company to its patrons. Whether it appreciated at first the value of such things or not, the Durham Traction Company, of Durham, N. C., was fortunate in selecting for its general manager a man possessing in an unusual degree the qualifications mentioned. This man is R. L. Lindsey. Perhaps it should be explained, though, that for a time Mr. Lindsey was not the general manager of this concern. He secured his position by demonstrating his worth to his employers.

Mr. Lindsey was born in North Carolina, thirty-eight years ago. Through his own efforts, he obtained a good business education; and, realizing the value of legal training to a business man, he studied law and, at the age of 21 years, secured an attorney's license. Soon thereafter he came to be recognized as one of the most skilled accountants in the state. In 1899 he was appointed secretary and treasurer of the Durham Electric Lighting & Power Company, and when the larger company which he now serves took over this business he became its auditor and assistant to the president. In 1905 he was made general manager.

The Durham Traction Company was one of the first central stations in the South to take up the manufacture of ice in connection with the generation of electricity for lighting, motor service and the operation of a street railway. The company serves a town of some 2,500 people, and its car lines and power circuits extend well out into the surrounding country besides. Its policy is to keep its service within the reach of citizens of the community. During the seven years of Mr. Lindsey's management the lighting load has increased 600 per cent in point of number of patrons connected.

R. L. Lindsey.

Personally there are few young men in his city better known or more generally liked than is R. L. Lindsey. He has served as a member of the Board of Aldermen, is now a trustee of the Watts Hospital, and is interested in other local organizations.

He is a Mason, a Pythian, an Elk, and a member of various other fraternal and business clubs.. His popularity and enterprise are valuable assets to his company.

Ohio Assessments Larger.

Increases amounting to about $5,000,000 are made by the Ohio State Tax Commission in the values for taxation of the electric light companies of the state, as compared with last year. The total increases made are $5,093,785, but decreases amounting to $117,175 make the net increase $4,976,610. The increases bring the tax value of the combined properties up to $34,420,895, compared with nearly $28,000,000 in 1911 and $6,437,941 in 1910.

Agitation for Municipal Plant in Johnstown.

A mass meeting of the citizens of Johnstown (N. Y.) will be held at the courthouse at which the special committee appointed at a previous mass meeting to look into the advisability of installing a municipal lighting plant in Johnstown and to gather such figures and data as they may find, will have a report of their investigation ready. The committee has visited a number of cities where municipal lighting plants have been installed and their report will undoubtedly be an interesting one. The present lighting contract with the Fulton County Gas & Electric Company expires next spring and the members of the common council and the Johnstown Progressives are desirous of deciding the matter either of securing a lower rate from the gas and electric company or installing a municipal plant.

New Business Increase in Louisville.

The Louisville Lighting Company, of Louisville, Ky., is breaking all records in the acquisition of new business, according to A. T. Macdonald, general sales manager of the company, who reports that last month's records show that there was a 20 per cent increase in the station load as compared with the corresponding month in 1911. The amount of new business booked during the current month promises to establish a new record for September, and it would not be surprising if the total would be larger than that of any other month of the year.

Booklets Aid in House-Wiring Campaign.

The Emporia Railway & Light Company, Emporia, Kans., is getting excellent results from distributing a specially prepared booklet to prospects for house wiring a few days before the visit of the company's solicitor. The booklet contains illustrations of the various fixtures used in the different plans and gives complete information relative to price for wiring under each of the eight plans, cost of extras, etc. The booklet is distributed by boys, under the supervision of the company solicitors, and in a measure familiarizes the house owner with the proposition, thus aiding the solicitor.

Transportation Conditions in San Francisco.

An extensive report dealing with transportation conditions in San Francisco and vicinity has been submitted to the administration by Bion J. Arnold, of Chicago, who has been retained to make an analysis of conditions there.

Electrical Construction

NOTES ON THE ELECTRICAL WORK IN A MODERN SCHOOL BUILDING.

Some Account of Equipment and Installation.

The requirements to be met in the installation of electrical apparatus in any modern school building are particularly exacting. For reasons that are easily apparent, only the best types of construction can be permitted here. Hence a study of the electrical work in such a building will usually be found of especial interest and value to the electrician. The following notes have to do with some of the electrical equipment in a large technical high-school building, descriptions of the installation of circuits and apparatus being incorporated in the paper. The equipment to be considered is that of the Lane Technical High School, one of the public schools of Chicago.

The building is a modern structure five stories high in the center, with three-story wings, the ground dimensions being 331 feet by 174 feet.

Since this is a technical school, it is found desirable to supply the power needed for lighting, heating, ventilation, and so on, from an isolated plant located in the school building. This plant contains three 250-volt direct-current dynamos, each one of them direct-connected to a steam engine of the riding cut-off type. Power for motors is distributed over the building by means of two-wire circuits, 240-volt motors being used, but three-wire distribution is employed for the lighting system. The operation of three-wire circuits from two-wire dynamos is provided for by means of the usual type of direct-current compensator. This consists of two direct-current, 110-volt, 14-kilowatt machines connected together mechanically by having the two armatures mounted on the same shaft, and connected electrically in series, across the outside wires of the three-wire lighting system, the neutral of this system being tapped off between the two armatures.

When the lighting load is balanced, the compensator takes only sufficient energy from the switchboard to supply its no-load losses; when either side of the lighting circuit becomes more heavily loaded than the other, the end of the compensator on the lightly loaded side runs as a motor and drives the other end of the machine as a generator to supply power to the more heavily loaded side of the three-wire line.

Fig. 3 is a front view of the switchboard in the dynamo room, the first three panels on the left being generator panels. It will be noted that the generator switches are three-pole switches. One blade of each three-pole switch is connected in an equalizing circuit, there being an equalizer wire from each one of the generators to the switchboard.

From the fourth panel from the left end of the board, the compensator set is controlled. All rheostats are mounted on the rear of the switchboard. The three control wheels seen just above the watt-hour meters on the generator panels are used to control the shunt-field current of the dynamos; while two of the wheels on the front of the compensator panel are used to adjust the resistance in the shunt fields of the compensator, and the third to control the resistance which must be thrown into the armature circuit of one end of that machine at starting.

Panels 5 and 6 are power panels, and the remaining two are for lighting.

The switchboard, which is of a high grade of marble, stands some two feet in from a wall, along the opposite side of which there extends a wide hallway across this part of the building. Throughout the length of the board there are glass doors in the wall, and through these the entire back of the board is easily seen. Whenever repairs or alterations are necessary,

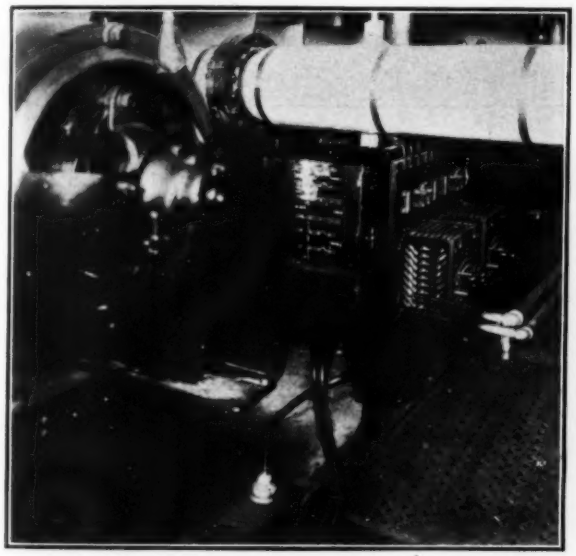


Fig. 1.—Fuse Cabinet for Motor Circuits.

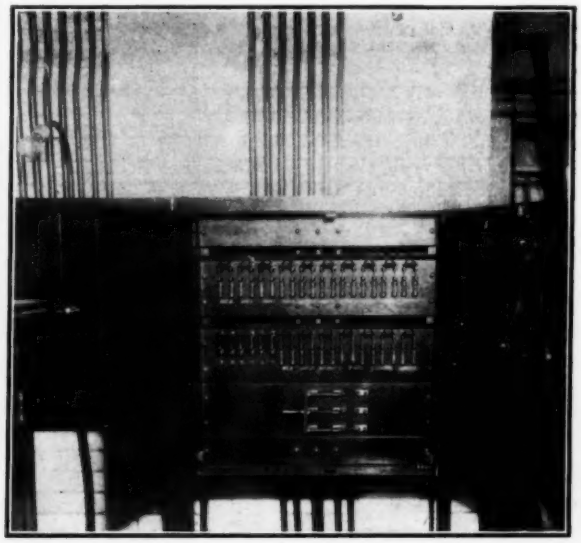


Fig. 2.—Cutout Cabinet for Lights in Boiler and Engine Rooms.

the back of the board may be reached by opening the glass doors.

The leads from the dynamos to the switchboard are run in conduits laid in the cement floor, there being a pipe for each lead. At the generator, and at the board as well, the end of each pipe is threaded and a bushing of the type used where conduits are run into cut-out cabinets screwed on it. The end of the pipe is then filled around the conductor with a waterproof insulating compound. From the switchboard, feeders for lighting and power run in the floor to the bottoms of the wire shafts containing the vertical risers of the distributing system. These feeders can be seen in Fig. 3, at the base of the board. The switchboard ends of these conduits are bushed and filled just as the ends of those containing generator leads are.

It is interesting to note, in passing, that, although there is no high-voltage apparatus in operation, the floor in front of the switchboard and at the commutator ends of the generators and all large motors is provided with insulating mats. Thus the probability of any attendant or student accidently receiving even a slight electric shock to ground is made very remote.

The wiring to the motors in the building in question is laid out and installed unusually well. Where several machines are located not far apart, a feeder is run from the main switchboard in the dynamo room to a sheet-metal fuse cabinet located as nearly as is convenient at the electrical center of gravity of the group of motors in this neighborhood. From here branch circuits are run to the individual motors, each circuit being fused within the cabinet. All cutout cabinets in the building, whether for lighting service or motor circuits, are provided with spring doors which keep the cabinets closed except while the doors are purposely held open. In Fig. 1 the fuse cabinet for a group of motors is shown, with the spring doors wedged open. One of the motors fed with current from this cabinet is also shown in the photograph, as are the starting rheostats for this machine and one other.

All motor-starting rheostats are mounted on slate bases, in the installation under consideration. Where the rheostat is supported from a wall, support is effected by means of a substantial angle-iron frame which holds the slate base well away from the wall, leaving room for the conduits to be carried up behind the starting-box, and for the free circulation of air around the box.

The installation shown in Fig. 1 is in a gallery above the main switchboard. Here both fuse cabinet and motor-starting rheostat are mounted on angle-iron frames resting on the gallery floor.

Fig. 2 is a photograph of a cutout cabinet on the lighting service. From this center the boiler-room lights and lights over various large motors and other machines are controlled. This cabinet is located at a convenient point in the engine room. In another cabinet in this room the cutouts and switches for exit lights at doors, fire escapes and passages are installed. Rear fire-escape lights have four circuits, in order to comply with the requirements of the electrical department of the city in such matters. The cutout cabinets at the distributing centers for the other lighting circuits than those mentioned already are located in hallways, at convenient points throughout the building.

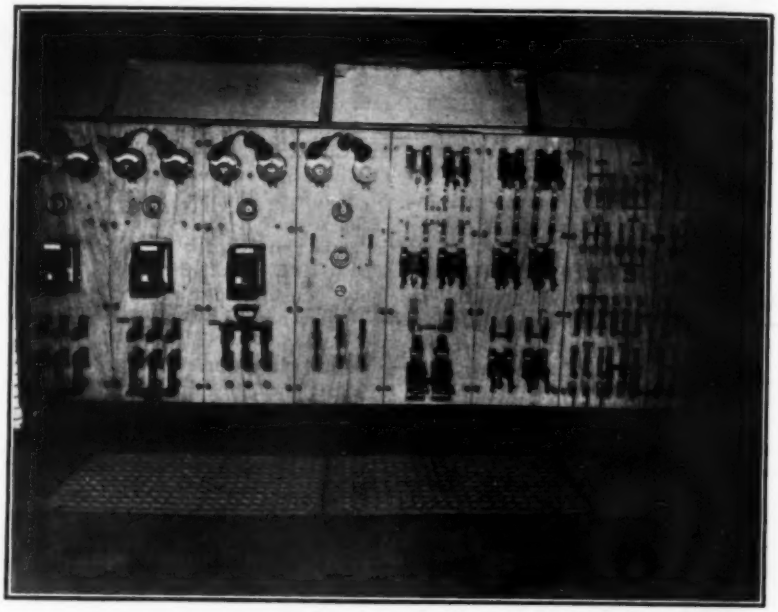


Fig. 3.—Front of Main Switchboard.

While concealed conduit wiring is employed throughout most of the building, it was found best to install exposed conduit work in the boiler room and in certain other parts of the

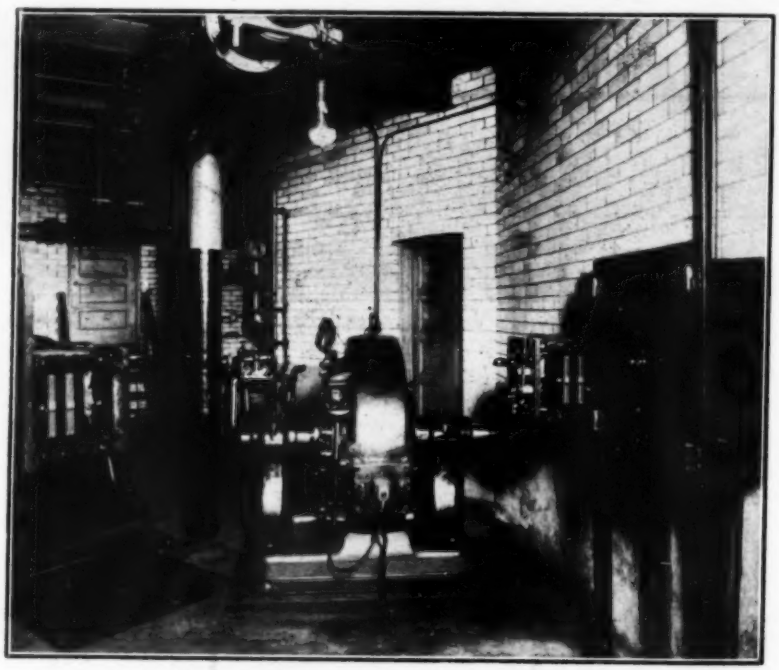


Fig. 4.—Wiring to Motor and Part of Lights in Engine Room.

basement. A small amount of this work is shown in Fig. 4. Where this kind of construction is employed, the conduits are run, as much as can conveniently be, along the under surface of the I-beams which support the first floor of the building. Fig. 6 shows, in section, the device employed for holding the exposed conduits in place. A piece of three-quarter-inch board, properly painted, five or six inches long, and about the width of the bottom of the I-beam, is fastened to the beam by means of the clips, one of which is shown in the figure. These clips are strips of iron, and one end of each strip is screwed to the board and the other bent so as to hook over the beam. There are two clips on each piece of board, these two being on diagonally opposite corners of it. The conduit is held in place by the usual sort of pipe strap.

There are other ways, of course, of supporting conduits from I-beams, but this one is none the less interesting.

Fig. 4 also shows some of the wall receptacles for attachment plugs which are installed wherever in the building an extension lamp is likely to be needed for the inspection of a piece of machinery, or for some similar purpose. The fuse cabinet seen in the photograph contains the branch cutouts for the motor shown and for two others near it. The feed to the large motor, as will be noted, passes out of the box to the motor-starting rheostat and then back into the cabinet and to the motor through a pipe laid in the floor.

Since in the Lane School many evening classes are conducted throughout a large part of the school term, it is especially important that the lighting in the building be ample and properly designed.

One of the most interesting lighting schemes is found in the electrical-construction shop. Here there is good general illumination, and also special local lighting for machines and work benches. Of the lighting on machine tools that on the lathes here is typical. Along the side of the lathe and attached to it with pipe straps, a half-inch rigid conduit is run to a suitable floor box. The pipe is turned upward near the power head of the lathe and an insulating joint is screwed on the end of it. Above this joint there is a Type A condulet with a metal cover having a male nipple. A desk-lamp fixture is then attached by means of a hickey.

Fig. 5.—Part of Electrical-Construction Shop.

The fixture used is of a type which permits the lamp on it to be readily shifted into a variety of different positions, and the light turned in almost any desired direction without difficulty. A hood-shaped steel reflector focusses the light on the tool and keeps it out of the workman's eyes. This is certainly a great improvement over the makeshift devices so frequently employed.

Novel Use of Postcards in Electrical Contracting.

An English contractor distributes postcards among people who may need his services, on which are his business address and telephone number, and lines where the customer may indicate his wants. The card is intended to be hung up with the customer's meter card until needed.

Lessons in Some Recent Electrical Fires.

Recent examination into the causes of a number of fires of electrical origin showed most of them to have been preventable. There are, of course, failures of insulation which cannot be anticipated without prohibitive expenditures for testing, but, on the other hand, a large percentage of the fires and accidents occurring yearly as a result of improper electrical conditions result from those operating plants or engaged in construction in close proximity to electric circuits failing to exercise the proper amount of care.

Loose connections are always fertile causes of trouble, as illustrated in the case of a low-potential arc lamp having a loose binding post. The contact was so poor that the insulation of the wire was ignited, and about 18 inches were burned off, charring the floor timber from which the lamp was suspended and threatening the entire building.

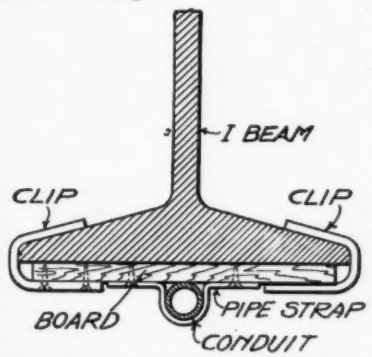


Fig. 6.—Method of Fastening Conduit to I-Beams

In another instance, a fire loss of over $10,000 resulted from placing an oily piece of canvas over a motor operating in a coal-hoisting tower. Sparks from the contacts of the controlling switch were communicated to the canvas, and the adjacent woodwork was immediately set afire. The use of an asbestos guard or a rubber-blanket covering would have prevented the trouble.

Again, careless handling of tools and metal around wiring often results in serious damages. In one case men working in a cellar of a building partially torn down brought an iron pipe in contact with the live terminals of a service switch, current passing from this pipe to a gas pipe in front of the building, melting a hole in the gas pipe and setting fire to the gas. A loss of $225 resulted from this apparently trifling carelessness in handling the pipe.

Dampness is always a foe to insulation, even on low-potential circuits. A slight fire occurred in one plant, due to the insulation of a wire in molding

deteriorating on account of damp conditions. Electrolytic action took place, the wire becoming corroded to a fracture point, and when it broke, an arc established the incipient blaze.

Poor mechanical construction in supporting a steam-heating line led to the pipes falling across the service wires which were burned off, with subsequent melting of a hole in the steam piping and a small fire in clothing hanging nearby. In another case a staging used in the construction of a new building was brought in contact with a series arc-lighting wire; on account of rain the staging and the insulation of the wire were wet, and when the circuit was closed at night, arcing and burning occurred between the wire and the staging.

Combinations of circumstances which result in the starting of many fires are highly suggestive. In one instance a short-circuit occurred in the wires leading to a rheostat which had been temporarily placed above a large belt. The "short" was insufficient to blow the fuses or to open the circuit-breakers, but continued as a small arc with the result that several drops of melted copper fell upon the belt and were carried along with it and thrown among the papers on the chief engineer's desk near-by; the loose papers being set on fire and destroyed.

The wires of a city arc machine and the conduit from the magnetite arc system were so close on the basement ceiling that after whitewashing the ceiling the insulation became wet and allowed the current to jump across to the conduit, starting a fire. The trouble was discovered by flashing on the magnetite loop, which attracted the attention of the operating engineer, and immediately afterward smoke was seen coming from the basement. Sand extinguished the fire.

The floor of a power house was also set on fire by excessive heating of battery wires connected with an engine-stop device, the wires having become crossed with the local 500-volt service. The incident demonstrated the vital importance of separating low-potential circuits from lines carrying dangerous voltages and of avoiding all loose wiring in interior work unless of approved flexible construction.

Sand quickly extinguished another fire which was found under the ratchet of the slide-rail on a three-wire direct-current generator. The rails rested on foundations six inches below the floor level, and the flooring had to be cut out to allow the ratchet to be worked. This open space had become filled with an accumulation of waste ravelings, sweepings, etc., and a spark from the brushes apparently fell into the hole and started a smouldering fire.

In another plant of rather out-of-date design a fire was caused by the commutator on a belted generator flashing over and setting fire to a transmission rope which ran directly above the commutator. The burning rope carried the fire to the oil-soaked floor and to the ceiling of the engine room; the floor and roof timbers being burned and scorched, and one transmission rope so badly scorched that it had to be removed. The entire plant was shut down for two hours. Later a non-combustible shield was placed between the commutator and the rope.—*Power.*

Interesting Notes from the Electrical Ordinances of a Small City.

It is especially encouraging to note the progress which is being made toward a more general introduction of the better methods of electrical construction in some of the smaller cities and towns. The writer recently visited a number of such cities and towns in the South in which, as he happens to know from having lived in the section visited, such an official as a municipal electrical inspector was, as lately as five years ago, an unknown quantity, and the use of conduit wiring almost as rare as the existence of the municipal inspector. Many of these places now have municipal electrical departments which, on the whole, are well constituted, and these, in co-operation with insurance interests and the electrical contractors, are doing much to encourage the increased use of high-class conduit construction.

The electrical ordinances of some of these towns make very interesting and helpful reading for persons concerned with electrical construction and inspection. The following are some abstracts from the ordinances of the city of Greensboro, N. C., where M. M. Boyles has lately been appointed electrical inspector.

The inspector in this city, which is one of the largest markets for power of the Southern Power Company, is appointed by the board of aldermen and may be removed at any time for reasons satisfactory to the board.

The charge for inspecting inside work of not more than three outlets is $0.50; for more than three and not over ten outlets, the charge is $1.00; from 11 to 15 outlets, $1.50; from 16 to 24 outlets, $2.00; from 25 to 50 outlets, $4.00; for more outlets than this, up to 100, the fee is $6.00, while for the inspections of installations in which there are more than 100 outlets, $10.00 is charged. The fees for inspecting motors and outside work are comparable to those just mentioned.

The inspector is required to insist upon the following rules of the South Eastern Tariff Association in all electrical construction.

Every electrical contractor or his supervising electrician is required to secure a license from the city tax collector before he may take charge of the installation of electric wiring. The license tax is $10.00 a year, and the contractor or his representative is required to file a bond of $500 with the proper official of the city, which may be forfeited by failure to comply with the rulings of the electrical inspector or othewise violating the ordinances pertaining to electrical construction. Before a license is granted, the applicant for it must appear before the board of fire commissioners and the electrical inspector and satisfy them, by passing whatever examination they consider necessary, that he has sufficnent knowledge, both practical and theoretical, and has had sufficient experience to qualify him to install electrical work.

As is customary in most places, a permit must be secured from the inspector before the work on any job of wiring may be begun, and the central station must secure the certificate of inspection before connecting the service.

How a Contractors' Reputation May Suffer.

A contractor, remarks *The Electrical Times,* is very much in the hands of his workmen, and unless he is in a position to employ foremen upon whom he can rely with confidence, he cannot be certain that the work of his men will not be scamped now and again. Unfortunately, an incompetent wireman may do a lot of damage to the reputation of his employer before being found out, and it is little satisfaction to discharge the man, since this does little or nothing towards removing the bad impression formed of the contractor's ability by his clients. So much of a contractor's duty consists of detail work and small jobs which do not justify the employment of a foreman, that the wireman is usually entrusted with the work in the belief that he will carry it out satisfactorily. A customer will not usually grumble until something serious happens, but will often put up with faulty work sooner than lodge a complaint; but the contractor loses his client's confidence and his further orders all the same.

In a certain case a wireman was sent to a drapery shop when a sale was in progress to fix the main switch controlling temporary circuits, the wiring being completed and the ends let out ready for connection. This job should have taken a half hour. After several hours the man returned to the shop and asked the contractor to walk round, as he had got into a muddle. It was

then nearly dark, and upon arrival the employer found that the intelligent wireman had, for some reason which he could not explain, instead of simply fixing the main switch, as instructed, dismantled the distributing and switch boards and uncoupled all the connections, getting the circuits hopelessly muddled. In the circumstances, it was impossible to get the lights running that night, and the draper had to close for the night. Needless to say, he employed another firm next time when anything else electrical required attention.

This contractor was called in to put in order an intercommunicating telephone system in a large country establishment. One of his wiremen claimed to be an expert on telephones, and was sent down to do the work. After several days, during which he mixed up all the conductors in the multiple cable so that no two colors were connected aright, he gave up the attempt, and his employer in the end had to spend a couple of days repairing his man's mischief and putting the system to rights. Sacking the man was poor consolation for the loss of his client.

Instances similar to the foregoing might be multiplied *ad nauseam,* but sufficient has been said to emphasize the necessity for putting wiremen on jobs only when their past record points to conscientious and competent work, whether under the eye of a foreman or in the absence of any foreman at all.

Examination for Laboratory Assistant.

The United States Civil Service Commission will hold an examination on October 23 at the usual places to fill vacancies in the position of laboratory assistant, qualified in engineering, in the Bureau of Standards, Washington, D. C., at salaries ranging from $900 to $1,200 per annum. The examination will cover general physics, experimental engineering and the theory of materials. Education, experience and fitness will also be considered in grading the applicants. Applicants must be graduates in mechanical or civil engineering and have good training in mathematics and physics. Experience in an engineering laboratory is also desirable. Applications should be made on Form 1312.

Wiring for Signs.

The Cincinnatti Fire Prevention Bureau follows uniformly the practice of refusing to approve wiring for signs or other devices on the outside of buildings when the wires are not run in iron conduits from the meter or source of supply to the sign or device.

P. T. Elliott.

Among the younger men in the electrical-contracting businesss there are very few more aggressive than is P. T. Elliott. And there are few men who in a field no larger than that in which he is located are winning a greater measure of success. Mr. Elliott is one of the leading electrical contractors in Durham, N. C. He began work there in the construction department of the Durham Traction Company in 1904. He continued in the employ of this company until the spring of 1906, when he went to Jamestown, Va., and began work as a journeyman electrician on the buildings then being erected for the Jamestown Exposition. After a month or two at this work, he became a member of the firm of Elliott & King, electrical contractors, of Jamestown. This firm lost heavily because some of the large Exposition buildings in which they had installed wiring were burned before completion.

P. T. Elliott.

Mr. Elliott returned to Durham four years ago and started in the contracting business there for himself. His resources being quite limited, he began on a very small scale, having for his shop and offices an upper room 10 by 20 feet in floor space. His business prospered and grew, however, until last spring he was compelled to seek larger quarters. He then bought a lot and erected a large building at 227 West Main Street, the three lower floors of which he now occupies with what is known as the Elliott Electrical Store, which is unquestionably one of the most attractive business places of the kind in the South Atlantic States. The main floor of the building is a salesroom and office; the basement is used as a shop and stockroom, while on the second floor there is a display and demonstration room of unusual attractiveness.

Mr. Elliott is one of the largest advertisers among the business men of Durham, which place is one of the most progressive of the Southern cities. The opening of his store last spring was an event which drew thousands of people to his place of business within the course of an afternoon and evening, and which attracted unusual attention among electrical people in other sections. A thing that attracts the attention of a visitor to any part of the city now is the prevalence of neatly designed posters advertising electrical devices and appliances which one sees on the large billboards all around. The posters are his.

Elliott deserves to succeed and he is succeeding.

Among the Contractors.

R. C. Bierdeman, 4740 North Ashland Street, Chicago, is wiring a building for Otis & Swanson, of Chicago, for 1,000 incandescent lamps.

The contract for the rewiring of the Court House of Kanawha County, W. Va., has been awarded to the Kanawha Electrical Engineering Company. The contract price is $2,500.

W. J. McKillip, 4032 West Madison Street, Chicago, is wiring a building for Gottschalk & Company, in this city, for 500 incandescent lamps and one large motor.

The White City Electric Company, 229 West Van Buren Street, Chicago, has been awarded the contract for wiring a large building for the Kellogg estate, in this city. In addition to a small equipment of motors, there will be about 1,700 incandescent lamps.

The Harry I. Wood Company, of Louisville, Ky., has received a contract for wiring The Republic, one of Louisville's newest and handsomest office buildings. The Republic is eleven stories in height, located at Fifth Avenue and Walnut Street. It is owned by the Great Southern Fire Insurance Company, of Louisville, and is one of the features of the building year in that city.

The Colonial Electrical Construction Company has been organized and is beginning business with offices at 53 West Jackson Boulevard, Chicago. B. M. Grayhill is the manager of the new company. Mr. Grayhill left the Chicago staff of municipal electrical inspectors to assume the duties of this place, having been an inspector during the past three years. Before becoming an inspector he was engaged in practical electrical construction for a number of years, in Chicago. For six years he filled various positions with the McFell Electric Company, one of the largest concerns of its kind in the city. His extensive practical experience should assure him a large measure of success as a contractor.

National Association of Electrical Inspectors.

THOMAS HENRY DAY, president, 59 Deerfield Street, Hartford, Conn.
JAMES BENNETT, vice-president, 524 Coristine Building, Montreal, P. Q.
WILLIAM LINCOLN SMITH, secretary and treasurer, Concord, Mass.
JAMES E. COLE, National Conference Representative, 11 Wareham Street, Boston, Mass.

Executive Committee:

H. S. WYNKOOP, chairman, 13 Park Row, New York, N. Y.

Frank R. Daniel, R. P. Strong, Henry E. Knight, Washington Devereux, James B. McCarthy, W. Lincoln Smith, James Bennett, C. W. Mitchell, George L. Collison, T. H. Fritts, James S. Meade, T. Henry Day, James E. Cole, Thomas D. McColl

Secretary's Message.

A note has been received from F. L. Warner stating that his address hereafter will be 318 West Fifty-seventh Street, New York City.

The Secretary desires to explain that the fact of the appearance of matter in only one September number was due to delay in the mail service—not Uncle Sam's, but private. The copy started from camp in a gentleman's knapsack in due time to get the mail. But, in the course of the 19-mile walk from camp to railroad terminus, a very heavy rain came on; so the bearer decided to lay up over night at a lumber camp about half way in, and this resulted in the material arriving in Chicago too late for use until September 21.

The cause of so few replies to these questions appears to lie in the fact of vacation absences, which is good and sufficient in the Secretary's opinion at least.

In this connection he may say that he has just received from President Day a note in which he says he is leaving September 27 for Bermuda. The Secretary feels sure that every member will heartily join in wishing our President a pleasant and restful trip.

In regard to the matter of *dues*, nearly one-half our members have not yet replied to the Secretary's notice, and he urgently requests them to do so. Also, he wishes the members to look carefully at the papers received and not mistake *receipts* for bills, as up to date eleven members have done. The Secretary expects to be called down for some things but thinks this reason a wee bit rough.

With reference to the two questions appearing in this issue a few words may be said.

Regarding No. 199, most certainly there is no prohibition in the Code, and Rule 24*b* (fine-print note) may, as suggested, give some permission by implication. However, in the Index section *a* is the only section of this rule designated as referring to service switches. But Rule 65*a* reads as follows: "Must when used for service switches, indicate, on inspection, whether the current be 'on' or 'off.'" This obviously can have no meaning unless it refers to snap switches, because knife switches cannot help giving this indication. Consequently we must conclude that the Code does contemplate the use of snap switches under such conditions.

Regarding question No. 200, it would appear that the matter is purely one of design and not one over which either inspector or code directly exercises jurisdiction. All the inspector can do is to insist on the proper fusing under Code requirements, which will very promptly bring out evidence that the common wire in this case carries more than 40 per cent more current than the others.

The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.

It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.

The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.

The Use of Snap Switches on Services.

Question 199. Is there any definite prohibition in the Code of the use of snap switches for services, and if not, should such use be prohibited?

Answer 1. There is no definite prohibition in the Code against the use of snap switches for service switches. In fact, the Code, in a fine-print note, rather encourages the limited use of snap switches, as will be seen under section *b* of Rule 24, to-wit: "Up to 250 volts and thirty amperes, approved indicating snap switches are suggested in preference to knife switches on lighting circuits."

Answer 2. I can find no such prohibition. All precedents, however are against the practice; but in order to secure actual field experience we have given a provisional permission to one company to employ double-pole snap switches on their smaller services, and the result is being watched very carefully.

Answer 3. No; there is no definite rule prohibiting the use of snap switches for service switches. The use of them, however, should be prohibited.

Answer 4. The National Code does not prohibit the use of snap switches for services; the only restriction on the type of switch being that it must disconnect all the service wires. I see no good reason why a double or triple-pole indicating snap switch of suitable capacity, say 30 amperes, should not be used for service purposes.

Answer 5. Snap switches (except single-pole switches) are not prohibited for service switches; but, on the contrary, such switches are recommended by the fine-print note under Rule 24*b* for the use up to 250 volts and 30 amperes.

Answer 6. There is no prohibition in the Code, and on circuits of small capacity there should be none. This would be our attitude if the question came up in our territory.

Size of Middle Wire on Three-Wire, Two-Phase Circuit.

Question 200. Under what rule can the capacity of the common wire of a two-phase, three-wire system be required to be 50 per cent larger than that of either of the other two?

Answer 1. Under Rules 8 and 23, each wire of a motor circuit must be protected by a properly proportioned fuse; so, if the common wire was the same size as the wire of each phase and the wires were of a size based on the amperes per terminal, the common wire would be overfused.

Answer 2. We find that we have to handle this point under Rule 23*e*, warning the contractor that in our experience this rule will be violated if he does not provide 50 per cent excess capacity for the common wire. If he objects, we can generally prove our case by giving permission to place the equipment in service temporarily, and then calling attention to the size of fuse that is actually required to keep current on the line.

Answer 3. Under Rule 18*a*, "Allowable Carrying Capacity of Wires," the common wire of a two-phase three-wire system would be required to have a capacity of 1.41, or the square root of 2, times that of the other wires, this being the relative value of the currents carried by the respective wires in a balanced system. Practically applied, 150 per cent is specified instead of only 141 per cent.

Answer 4. Rule 18*a* might be considered to give the inspection department authority, in a very general way, to question the size of a conductor with respect to the actual current carried; but since this current is a variable quantity, and bears no fixed relation to the connected load, it follows that the inspector has no direct Code authority to determine the size of the conductor beyond the point at which the proper fuse can protect it.

Answer 5. There is no rule under which an inspector can call for any definite sized wire except, perhaps, in the matter of grounds, and then only in a general way.

Public Service Commissions

NEW YORK.

The Public Service Commission, First District, has denied the request of the New York Railways Company and five other street car companies of New York and Brooklyn for permission to operate a line of trolley cars across the Manhattan Bridge over the East River under a temporary permit granted by the Bridge Commissioner February 29, 1912. This action was taken under an opinion by George S. Coleman, Counsel to the Commission, holding that the Bridge Commissioner has no authority to issue such a permit and that all franchises for street-railway operation should be granted by the Board of Estimate and Apportionment. The Manhattan Bridge, although completed for two or three years, was not used for trolley-car service until this summer when the Manhattan Bridge Three Cent Line, a new corporation, perfected its rights to operate over the bridge and started a line of cars. After the Manhattan Bridge Line had begun its fight for a franchise, the old companies in New York and Brooklyn combined in the formation of the Brooklyn and North River Railroad Company, which applied to the Commission for a certificate of convenience and necessity to operate a similar line across the Manhattan Bridge with transfers on each side of the East River to the New York and Brooklyn surface-car lines. The same company applied in due course to the Board of Estimate and Apportionment for a franchise, but pending the grant of such franchise, which has not yet been made, the individual companies which combined to form the Brooklyn and North River Railroad Company obtained from the Bridge Commissioner a revocable permit to operate a car line over the bridge pending the grant of a franchise. At the direction of the court, the companies applied to the Public Service Commission for permission to operate under this temporary permit.

The Commission last week received the report of accidents on railroads and street railroads of New York City for the month of August. This report showed that during the month 27 persons had been killed and 242 seriously injured. The number killed is three in excess of the same month last year, but nine less than in August, 1910. The total number of serious accidents is eight less than it was in August of last year. The total number of injuries, including serious and not serious, was 4,334, of which 2,970 involved passengers, 635 employees and 729 other persons.

OHIO.

The Public Service Commission has granted permission to the Ohio Traction Company to issue first-mortgage collateral-trust bonds of the par value of $750,000 on the requirement that they be sold for not less than 98 per cent of the par value. The proceeds are to be used for the acquisition of property and improvement of the facilities of the Cincinnati Traction Company. Permission was refused for the issue of preferred capital stock to the amount of $750,000. It was intended to use the proceeds of said stock to reimburse the company for money already expended for improvements. These improvements have been paid for out of the earnings received in the operation of the company.

The Cincinnati Traction Company has received permission to issue equipment-trust certificates of the par value of $340,000 to be sold at the best price obtainable and at not less than par. The proceeds are to be used in the purchase of 76 double-truck prepayment-type motor cars.

Permission was given for the purchase of the electric light plant at Beach City by Mrs. Orpha Gilmore from F. B. Schlafly for $8,000.

Electric light companies all over the state are watching with much interest for the ruling of the Commission relative to electric wiring. The Commission has been petitioned by the Ohio companies to approve a set of rules providing the companies shall bring their wires to within 18 inches of the outside wall of the building to be lighted. The electrical expert of the Commission demands that the company shall bring its wires to the inside wall of the building.

The Arcade Lighting and Heating Company of Dayton has been authorized to issue $1,500 of stock.

Among the Supply Men

C. D. Wilkinson, of the Minneapolis (Minn.) branch of the Western Electric Company, reports that Paul Joyslin has been appointed sales manager of this branch, succeeding J. M. Bateman, who has been transferred to the Omaha branch. Mr. Bateman will succeed Mr. Baldwin, who has left the company.

J. M. Hannaford, Jr., manager of the publicity department of the Northwestern Electric Equipment Company, St. Paul, Minn., reports that his company is conducting a special campaign on Fostoria Mazda lamps, known as the "Fostoria School-Boy Campaign." The salesmen of this company report unusually good business from Minnesota, North and South Dakota, and Montana, and are experiencing special demands in central-station improvements and construction.

W. H. Nolker, vice-president of the Commercial Electrical Supply Company, St. Louis, Mo., reports that his company is conducting a special sales campaign on electric heating devices, high-grade commercial drawn-wire tungsten incandescent lamps, and a new battery for ignition which is called the "Highest Grade Commercial Blue Spark Cell." This company expects to hold a sales convention in January, and its salesmen report very active business, and unusual demands for out-door construction material.

Ward, Drouet & Foster, Incorporated, 64 Pearl Street, Boston, Mass., report that they have opened an office in the Hudson Terminal Building, 30 Church Street, New York City, to be used as a sales organization only. They have also opened a specialty department in connection with their electrical supply business at 64 Pearl Street, Boston, for the exclusive sale of household current-consuming devices, including electric suction cleaners and various types of electric flat-irons, electric cooking and heating devices, sewing-machine motors, etc. They are the agents of the well known Bissell electric suction cleaner and the Bissell sewing-machine motors; also the Delco line of flatirons and cooking and heating utensils. They also sell their own flat-iron called "The Home," which iron is especially attractive to central stations in special flat-iron campaigns.

The St. Paul Electric Company, St. Paul, Minn., reports that it is experiencing large demands for telephones, which are selling rapidly.

The Wesco Company, with offices at St. Louis, Mo., Fort Worth, Tex., and Birmingham, Ala., has reorganized its sales force. The following changes have been made: Charles Scudder, Jr., sales manager; J. B. Trescott, manager of the apparatus department; R. A. Brooks, manager of the lighting supply department; D. E. Ford, manager of the telephone department; H. E. Spoeneman, manager of the lamp and fixture department; R. J. Ambler, manager of the advertising department; and A. E. Rosenberg, manager of the auto supply department. The salesmen report good business in all territories, and the company is looking forward to a period of big business.

The Korsmeyer Company, Lincoln, Neb., reports that it has been holding a sales convention this week.

B. F. Kierulff, Jr., of B. F. Kierulff, Jr., & Company, Los Angeles, Cal., writes that his company has been doing a great deal of power development work in Southern California during the past year, and has been experiencing a heavy demand for all kinds of line material.

The Interstate Electric & Manufacturing Company, Sioux City, Iowa, reports that B. C. Percival, its South Dakota representative, has succeeded C. W. Hinkley as purchasing agent, and will also assume the duty of office manager. Mr. Hinkley has gone to Boise, Idaho.

James Clark, Jr., president of the James Clark, Jr., Electric Company, Louisville, Ky., reports that at present they are looking forward to a big increase in general lines this fall.

The Railroad Supply Company, Chicago, Ill., reports that its salesmen are getting some unusual business among practically all the railroads in the United States and Canada. The special demands are particularly for electric signals, highway crossing alarms, and similar material for steam railroads.

LeRoy A. Mills, president of the Mills Electric Company, Peoria, Ill., and Tom Endsley of the same company, were among the "Boosters" who made up a special train under the auspices of the Peoria Association of Commerce, carrying jobbers and manufacturers' representatives to thirty towns on the Rock Island Lines in Illinos, September 12 and 13. The members exchanged greetings with the electrical fraternity in the different towns. W. S. Fink has severed his connection with the St. Louis office of the Westinghouse Electric & Manufacturing Company, and will take a position in the sales department of the Mills Electric Company, and will cover Missouri territory, in which he is well known to the trade. The company was represented with a booth and exhibit at the National Vehicle and Implement Show, which was held at Peoria from September 27 to October 5, inclusive.

J. L. Damble, sales manager of the Harry I. Wood Company, Louisville, Ky., announces that business has been particularly good in incandescent lamps and electrical glassware. He reports the sale of 41 400-watt Holophane units for th new office building of the Kentucky Electric Company, 20 reflectors ranging from 250 watts to 500 watts for another installation, and he has also received the contract to wire the Great Southern Fire Insurance Building

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The McClary-Jemison Machinery Company, Birmingham, Ala., reports that business is the best that it has been in the history of the company, covering a period of ten years. Things are certainly looking up in the Southland, and it is gratifying to note this positive evidence that the electrical industry is securing a part of the business improvement.

The Northern Electrical Company, of Duluth, Minn., reports that it has received an order from the Canadian Northern Railroad, with headquarters at Winnipeg, for all the electrical material and equipment to be used in shops and roundhouse of the railroad at West Duluth, Minn., including motors, switchboards, transformers and all of the miscellaneous wiring equipment.

C. R. Barrett, of the Current Electric Company, Chicago, Ill., states that business is improving generally, and sales show a material increase.

Questions and Answers

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 89.—Compact Series-Multiple Switch for Heaters.—Is there procurable on the market a compact series-multiple switch (not larger than an ordinary rotary snap switch) that may be used to connect the two parts of an electric heating element in series or in multiple so as to get a low and a high heat?—F. L. E., Lockport, N. Y.

No. 92.—High-Tension Underground Cables.—I have been told that it is proposed to use 60,000-volt underground cables in a German power system, but have always understood that 20,000 is regarded as the practical limit in this country. What makes it possible to raise this limit abroad?—H. W., Cincinnati, O.

No. 95.—Power Consumption of Vacuum Cleaners and Washers.—What is the watts consumption of the ordinary size of portable vacuum cleaners used in residences and small apartments? How many watts are required to run an electric washer and wringing machine for a family of six or seven persons? Must a specially heavy circuit be run for either of these machines or can they be connected to a regular lighting circuit?—E. H., Milwaukee, Wis.

No. 96.—National Code and City Rules.—In doing some wiring work in several of the large cities I have been considerably annoyed by having much more exacting requirements imposed than are called for by the National Electrical Code. Why is this? I have always believed that the Code represented the best joint thought of the electrical interests of the country. Why do a number of our cities think themselves above the Code?—A. C., Chicago, Ill.

No. 97.—Alternating-Current Water Heater.—Is it practical to build an electric water heater using alternating current passing right through the water and heating it by overcoming its resistance. Would this not have a higher efficiency than one with the ordinary heating element placed below the tank or imbedded in the bottom? What would have to be the spacing of the electrodes and what current would be required at 110 volts, 60 cycles, to raise the temperature of 50 gallons of water about 100 degrees Fahrenheit in half an hour?—B. N. F., Ames, Iowa.

Answers.

No. 91.—Extra Lighting on Moonlight Schedule.—In the case of a village that has contracted with a local electrical company for the lighting of its streets on the moonlight schedule, has the village the right to demand lighting on stormy or cloudy nights when the moon is obscured? Has this matter been the subject of controversy? What is the practice in regard to such extra lighting in villages where it is furnished?——W. M. V., Allegan, Mich.

When a town or village makes a contract with a lighting company to light its streets on the moonlight schedule it engages to have light furnished on certain nights and for certain hours, relying entirely on the moon for the illumination at other times. The company on its side undertakes to furnish light for a stipulated number of hours according to a predetermined schedule, such as the Philadelphia moonlight schedule; consequently the price that it bids for the contract is based on running the street-lighting circuit for that number of hours. If the village demands additional light without fair additional compensation, it is demanding something that the courts will not indorse, because the law contemplates that municipalities will render fair and equitable compensation for service done or material supplied to them. The best practice in towns where additional lighting is desired on moonless nights not foreseen in the moonlight schedule is to stipulate in the contract that some designated town official shall be authorized to request the company to furnish additional light, provided that the notice be given a sufficient number of hours in advance to prepare the plant and staff for operating the additional time, and provided that accurate record be kept by both parties of the number of additional hours that street lighting is furnished, the extra time being paid for at a stipulated rate per hour. This practice avoids all controversies and at the same time eliminates the disadvantage of the moonlight system of street lighting.—H. S. R., Elmhurst, Ill.

No. 93.—Grounding of Squirrel-Cage Rotors.—Why are the rotors on squirrel-cage induction motors grounded? I have taken several new motors apart and found them all in the same condition.—J. H., Rock Island, Ill.

The voltage set up in the bars of an induction squirrel-cage rotor is so low that no insulation is necessary to confine the current to the copper circuits. The comparatively high resistance of the laminated core as compared to the very low resistance of the conductors makes it possible to operate such high-amperage, low-voltage windings with no insulation other than the bare rotor slots. The potential from a common dry battery would be exceedingly high for giving a breakdown test to such windings.—W. H. M., Hutchinson, Kans.

In any induction-motor rotor of the squirrel-cage type the bars are all connected together and there is practically no difference of potential between them, since the secondary voltage generated is very small. This being the case, it is unnecessary to insulate the bars from the core. However, as the core is laminated to prevent eddy currents and a bare copper bar lying in the slots would connect the sheets together, a light insulation is placed on the bars where they lie in the core. On motors of any considerable size, say five horsepower or greater, the end rings and end plates are sometimes made in one piece to save labor. In such a case the end plates are built with stiffness enough to clamp the laminations by bolts passing under the core. The rotor bars are bolted to the top of the plate. An insulating strip is interposed between the end plates and the laminated core. In this case the rotor bars are grounded to the end plates, spider and shaft but not to the laminations.—H. E. W., Chicago, Ill.

No. 94.—Time Switch for Burglar Alarm.—I installed a burglar alarm in a private garage, whose owner has repeatedly complained that it did not work. Every time I test it I find it to be O. K. and I am convinced that the man's chauffeur chronically forgets to put it "on" when he leaves at night. Could a time switch be used to put it "on" and "off" automatically at the right time?—R. T., St. Louis, Mo.

I think the best way to assist R. T. of St. Louis is to tell of my own experience in a similar case in a suburb of New York. I had installed a very complete burglar-alarm system in a small jewelry store situated at the other end of the block from the residence of the owner. When the novelty wore off he or his clerks sometimes forgot to turn on the switch when closing up. After this happened several times he became alarmed and called me in to see what I could suggest. At first I was at a loss to know what to do, then a thought struck me. I went back to my store and took a second-hand eight-day time switch that I had been using in my own window for turning off the lights. It worked so well in its new capacity that I left it in the jeweler's store and got another for my own use. If the owner should object to the cost of an eight-day switch, a single-day clock could be used, but its use is open to the objection that the chauffeur might neglect to wind the clock every day.—T. A. F., New York, N. Y.

Yes, unless the man's chauffeur chronically forgot to wind it. I might give a description of a burglar alarm which I installed in a similar place, which I think overcomes that forgetfulness. A family had four young men boarders; the last fellow in was always too sleepy to put on the alarm switch, so I got four

electric door mats and put them on the bed springs, connected them in series to the door trips, bell and batteries and took out the switch. All four boarders had to be in bed before the alarm was on, then if any one opened a door the circuit was completed to the bell. The first boarder that got out of bed in the morning turned the system off by so doing.—W. H. M., Hutchinson, Kans.

It is entirely practical to use a time switch for this purpose. There are some very good ones on the market that are absolutely reliable and completely self-contained and automatic, except for the necessary weekly winding of the clock. There are usually some eight-day clocks about the house; I have found it a good practice to wind the time-switch clock at the same time as the other eight-day clocks; this prevents oversight of the time switch and insures its regular winding. For that matter, if it was very important, I don't doubt but that an electric self-winding clock could be fitted to the switch.—J. A., Toledo, Ohio.

Commonwealth Edison Section N. E. L. A.

At the meeting of the Technical Division, Commonwealth Edison Section of the National Electric Light Association, held in the rooms of the Western Society of Engineers on September 26, two papers on widely varying topics, both of considerable interest, were discussed. The first, read by Alex Bailey, assistant engineer of the Fisk Street Station, had the title "Human Engineering." D. Macrae, storage battery engineer of the company, presented a paper on "Storage Battery Engineering." About 150 members of the section were present at the meeting.

Mr. Bailey spoke principally of the great importance of proper organization and the similarity of a perfectly co-ordinated department of a company to a machine. He likened friction among employees to friction in an engine or generator, saying that it was as truly the work of an engineer to eliminate one as the other. The stimulation of interest through company sections, he said, is doing great things toward increasing the efficiency of many companies and as much more can be accomplished by bringing the organization more closely in line with engineering practice.

Mr. Macrae in his paper, "Storage Battery Engineering," brought out the fact that the improvements in storage batteries had all been made in a very few years. Before 1897 very little indeed had been done in a commercial way, and only two battery firms were in business; the Tudor Company, and the Electric Storage Battery Company, of Philadelphia. Two of our cities, Boston and Philadelphia, were then large storage-battery users, and both firms had battery installation in the two cities.

About that time it was realized that something had to be done to insure permanence of service, and freedom from any interruptions. At present the greatest use of the batteries is to keep the service permanent, whereas their first employment in the central station was to hold the voltage at normal. The original use, that of relieving the station at the time of peak load, has almost entirely disappeared and at the present time batteries are being installed for emergency work only. As an example of the new use, Mr. Macrae stated that in seven months in 1898 there were 15,700 kilowatt-hours taken from the batteries, while in 1911 with a much greater battery capacity only one-half as much power was used in the same length of time.

In 33 instances of breakdown which were nearly all from line trouble, there was interruption of from ten seconds to seventeen minutes, during which time the batteries carried the load. This amounted to from 25 to 100 per cent of the load at the time of interruption, and constituted the entire duty of the batteries.

Mr. Macrae showed a number of lantern slides illustrating the various types of battery plates. He also exhibited load curves of each section of the city.

In discussion, Ernest Lunn spoke highly of the Edison cell, commenting very favorably on its performance. Others joining in the discussion of the paper were D. W. Roper and R. F. Schuchardt.

Boston Vehicle Club Meeting.

The Electric Vehicle Club of Boston held its regular luncheon and meeting at the Thorndike Hotel, Boston, on September 25. Day Baker presided. Frank J. Stone, for the Committee on Advancing the Activities of the Club, reported a number of plans whereby the organization will be a force in pushing electric-vehicle interest and sales in this territory. A monthly bulletin is to be distributed to dealers and central-station managers which will give information of what is being done in the field. Howard S. Knowlton prepared the first paper, which has been published and distributed. Business men will be asked to address the meetings of the Club, on subjects pertaining to transportation, etc.

It was further suggested that envelope stuffers be prepared by the Edison Electric Illuminating Company, relating to the Boston Electric Show, and sent to the Boston representatives of the several manufacturers of electric vehicles, to be sent by them to their headquarters for distribution.

A characteristic central-station load curve is to be placed on exhibition in the public garage at the Electric Show, the object being to show where the electric-vehicle load fits in.

Another plan is for an electric-vehicle directory giving the names of dealers in electric vehicles and of garages doing charging.

Schemes for advertising are: (1) A screen on top of a moving truck upon which advertising matter could be thrown by a stereopticon carried on the truck. (2) A machine so placed as to throw advertising matter on the ground behind the car as it passes along the street. (3) A screen on a prominent street corner upon which pictures of electric vehicles are thrown by a stereopticon on the opposite side of the street.

Alfred Weatherbee, of the Detroit Electric Company, was appointed on the advertising committee.

Plans were discussed for entertaining delegates to the Electric Vehicle Association on October 8 and 9. Trips to historic points, golf grounds and seaside resorts are in contemplation, as well as a luncheon given by the Edison Company, and a theatre party.

W. W. Scott, of *The Motor Truck*, told of his investigation in New York where in certain businesses he found trucks were being run 75 miles a day in delivery service at a cost substantially less than gasoline service would cost. He found a general belief that up to 20 miles the electric truck is invariably the most efficient and economical delivery vehicle. At the Pacific Mills, Lawrence, Mass., five electrics are in service, and the purchasing agent maintains that they represent a 2 per cent saving over the former horse-drawn service. Mr. Scott holds that there is an unlimited field for the electric vehicle, and that every electric-vehicle salesman ought to be a specialist in transportation costs.

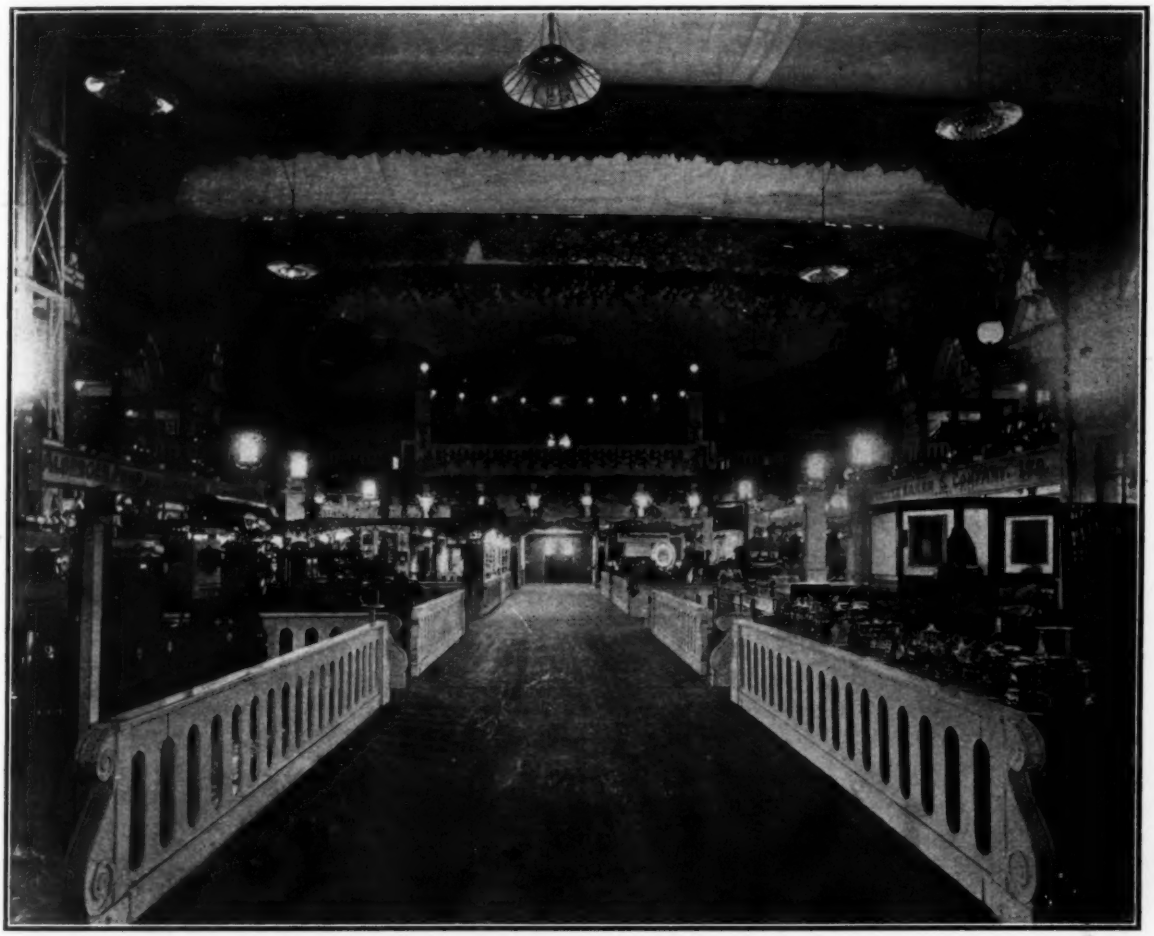
Electrical Protective League.

The second annual meeting of the Electrical Protective League was held in Chicago on September 23. This league is an organization of supply jobbers and electrical manufacturers of Chicago, and also includes a number of manufacturers' agents. Its object is to protect its members from theft of materials, manufactured products and supplies. The meeting was a very successful one. The year's work along this line was discussed and a great deal of headway has been made as the result of these efforts to put down a very troublesome feature met by many large employers.

The 1912 Boston Electric Show.

Auspicious Opening on September 28.—Description of Exhibits.

After a wide-spreading advertising campaign covering all of this country and several foreign countries, and a vast expenditure of money and labor in preparation, the 1912 Boston Electric Show opened on Saturday afternoon, September 28, with a private view for the delegates to the Fifth Congress of International Chambers of Commerce.



Grand Hall, the Main Hall of the Boston Electric Show.

In the evening the show opened to the public and the vast attendance which crowded every corner of Mechanics Building forecasts a record breaking success.

The show, which runs an entire month—a precedent for a show of this nature—is being held under the auspices of the Edison Electric Illuminating Company of Boston, which has assumed the responsibility for this big enterprise because it wished to see a comprehensive and inspiring educational exhibit adequately presented to the nearly ten millions of people of New England and to the country at large. This educational benefit is certain to be of tremendous importance and of consequent commercial advantage to the electrical fraternity as a whole. Over 300 central stations are co-operating with the Boston company to make the show a success. The show is without doubt the most complete and elaborate in variety of exhibits and decoration that has ever been attempted. The exhibit space has been sold to over 200 individual exhibitors, occupying the entire building, main floor, basement and balcony.

Rambling old Mechanics Building does not readily lend itself to interior decoration, but the work of the artists and illuminating experts has transformed it into a plan of surpassing beauty. Great care has been given to beautiful and efficient lighting and under the direction of Louis Bell the result has been most effective.

Outside the building Huntington Avenue from Copley Square to Massachusetts Avenue is a blaze of light, having as a central illumination Mechanics Building, which is outlined with 30,000 electric lamps, of many colors, arranged to give mosaic effect and making of the erstwhile dingy structure a real palace of fire.

Thousands gathered to see the illumination on the opening night.

The special mile illumination of Huntington Avenue consists of 44 artistic lamp standards; two fixtures at each end support 13 flaming arcs, while the remaining 40 fixtures each have four. Through the use of special carbons these lamps burn in green and pink colors. Grand Hall is the most elaborate and beautiful section of the exhibition. Here is reproduced a sub-

stantial German village on the Rhine—the effect being borne out by the gallery construction of chalets and the design of the exhibit booth, together with the panoramic painting which covers all the walls of the hall. Here is shown in bold relief at one end of the hall a typical Rhine castle, with the "Mazda" castle exhibit space of the General Electric Company at the opposite end of the Hall. In this section of the building are the exhibits of a large number of the prominent manufacturers of electrical apparatus and appliances.

In part of the adjoining section of the building on the main floor and known as Exhibition Hall, is the electric vehicle section exhibit, which bears out the design of an open park with trees and park lighting effects. Here a very complete line of electric vehicles for commercial and pleasure uses are on display. A completely equipped electric garage is located in the basement. In the basement are also most of the large number of exhibits showing the industrial application of electrical apparatus. These are unusually comprehensive in nature. Included among the working exhibits of this nature throughout the building are a bakery where one thousand loaves of bread are baked daily, a cleaning and dyeing establishment, a tea and coffee packing plant, motor-driven woodworking and machine tools of various kinds, electric welding, a model of an electrically operated chocolate factory, electric refrigerating apparatus, sugar sealing and packing, apple crushing, and many other applications, including a complete newspaper plant where the *Electric Show News* is issued daily under the direction of W. P. Edgar.

In the basement the Edison Electric Illuminating Company of Boston is showing in operation a very comprehensive exhibit of electrically operated apparatus used on the farm, and in the home. The farm exhibit includes apparatus for the running of every conceivable kind of farm apparatus by motors, including apparatus to cut clover, shell corn, grind green bone, cut roots and vegetables, run a cider mill, cut ensilage, split wood, saw wood, grind feed, hoist hay and a few other little things. There is also shown electric oat crushers, milking machines, horse clippers, churns, separators, milk testers, bottle washers—good for 1,000 bottles an hour—milk coolers, pumps for farm supply, house supply and irrigation purposes, an incubator and a brooder. This exhibit is the one that was recently shown by the company throughout the vicinity of Boston housed in a large tent.

The home exhibit shows chiefly the various cooking, heating and miscellaneous devices to lighten the housewife's burden.

In Grand Hall the Government makes a very interesting exhibit through the Bureau of Standards. This exhibit is designed to show the relation of the fundamental standards maintained at Washington to the commercial consumption of electrical energy and to illustrate the various lines of activity of the Bureau. Models of the mercury ohm, silver voltameter and the international kilogram and meter are on exhibition. Precision measurements in electricity, photometry and saccharimetry are illustrated by apparatus and photographs. The effect of stray electric currents on reinforced concrete is an important part of the exhibit. There is also apparatus for the testing of iron. Aside from the electrical work samples of railroad rails that have failed in service and fraudulent weights and measures found in use in various parts of the country are also on exhibition.

Vacuum tubes of the rare gases with spectroscope are shown, the tubes being blown into such a shape as to spell out the name of the gas.

George W. Vinal and P. G. Agnew are in charge f this exhibit.

A number of central station companies outside of Boston and several electrical associations have exhibit spaces. Practically all of these are located in a section of the balcony and are used chiefly as headquarters and for registration purposes.

The following electrical associations are included: Maine Electrical Association, New Hampshire Section of N. E. L. A., Vermont Electrical Association, Electric Vehicle Club of Boston, Electric Development Association of Boston.

The central station companies having space are as follows: Ayer Electric Light Company, Ayer, Mass.; Adams Gas Light Company, Adams, Mass., Cambridge Electric Light Company, Cambridge, Mass.; Clinton Gas Light Company, Clinton, Mass.; Daytona Public Service Company, Daytona, Fla.; Edison Electric Illuminating Company of Brockton, Brockton, Mass.; Harvard Gas & Electric Company, Harvard, Mass.; Lowell Electric Light Corporation, Lowell, Mass.; Lynn Gas & Electric Company, Lynn, Mass.; Leominster Electric Light & Power Company, Leominster, Mass.; Malden Electric Co., Malden, Mass.; Mill River Electric Light Company, Williamsburg, Mass.; Milford Electric Light & Power Company, Milford, Mass.; Narragansett Electric Lighting Company, Providence, R. I.; North Adams Gas Light Company, North Adams, Mass.; Northampton Electric Lighting Company, Northampton, Mass.; Spencer Gas Company, Spencer, Mass.; Stamford Light, Heat & Power Company, Stamford, Vt.; Turners Falls Company, Turners Falls, Mass.; United Electric Light Company, Springfield, Mass.; Worcester Electric Light Company, Worcester, Mass.; Williamstown Gas Company, Williamstown, Mass.

Creatore's band will furnish a musical program afternoon and evening during the first two weeks of the show, followed by Liberati's band for the last two weeks. During the time of the electrical show conventions of the New England Section of the National Electric Light Association and of the Electric Vehicle Association of America will be held; also a rejuvenation of the Sons of Jove.

Much credit for a show of surpassing excellence is due the show organization, of which Herbert W. Moses is manager, Chester I. Campbell associate manager, and Louis D. Gibbs, superintendent of advertising.

To E. W. Campbell is due the credit for designing and constructing the interior decorating.

Detailed List of Exhibits.

Alberger Pump & Condenser Company, of New York, shows two motor-driven centrifugal elevator pumps in operation. S. P. Taylor is in charge.

American Brass Company, through the Coe Brass Branch, of Ansonia, Conn., is making a fine display of its entire line of non-ferrous metals. William W. Cotter and W. F. Roohan are in attendance.

American Electric Tool Company, of West Newton, Mass., shows a line of electrically driven grinding, drilling and buffing machines.

American Insulator & Mica Company, Keene, N. H., exhibits samples of sheet and flake mica.

American Sign Company of New England displays its line of electric signs. John D. Hagar is in charge.

American Storage Battery Company, of Cambridge, shows its low-voltage lighting outfits and storage batteries for automobile lighting. A. A. Hayward and J. C. Kent are in attendance.

American Wood Working Company shows a number of motor-driven woodworking machines in operation. The company exhibits through its Boston representative, Frank K. Moore.

Albert & J. M. Anderson Manufacturing Company, of Boston, is showing a working exhibit of a motor-operated end-cell switch of 10,000 amperes capacity, and a circular type of 1,000 amperes capacity. A solenoid-operated switch and circuit-breaker of 20,000 amperes capacity is also shown. In addition is displayed a complete line of charging plugs and receptacles for charging vehicles, automatic time switches and a complete line of railway line material. Representative of the company are: John M. Anderson, A. E. Anderson, Andrew Anderson, John F. Stout, Kenneth L. Curtis, George B. Crane, H. K. Wilder and B. G. Durham.

Anderson Electric Car Company, of Detroit,, shows a commercial truck and three pleasure cars.

Ashton Valve Company, of Boston,

Mass., is showing a line of safety valves and steam gauges. William H. Hampson is in charge.

Atlantic Avenue Electric Garage has a completely equipped garage for electric vehicles in the basement section of the building. H. E. Campion is in charge.

Atlantic Vehicle Company, of Newark, exhibits one of its brewery trucks.

Auto-Foto Company, of New York, is showing through its Boston representative its automatic electrically operated machine which takes "Your picture for a dime in one minute's time." Harold Neuhoff and Henry Bleiler are in charge.

of Canton, Ohio. In attendance are A. W. Phillips and J. T. Glover.

Betts & Betts, of New York, exhibits its sign flashers. Incidentally the company's mechanism "turns the tower" on Mechanics Building. Represented by James H. Betts.

Blake & Knowles Steam Pump Works, of E. Cambridge, Mass., and the **Deane Steam Pump Works,** of Holyoke, Mass., are exhibiting jointly. In this space are shown miniature working models of Blake-Knowles engines, Deane pumps and Clayton air compressors. I. W. Jackman is in charge.

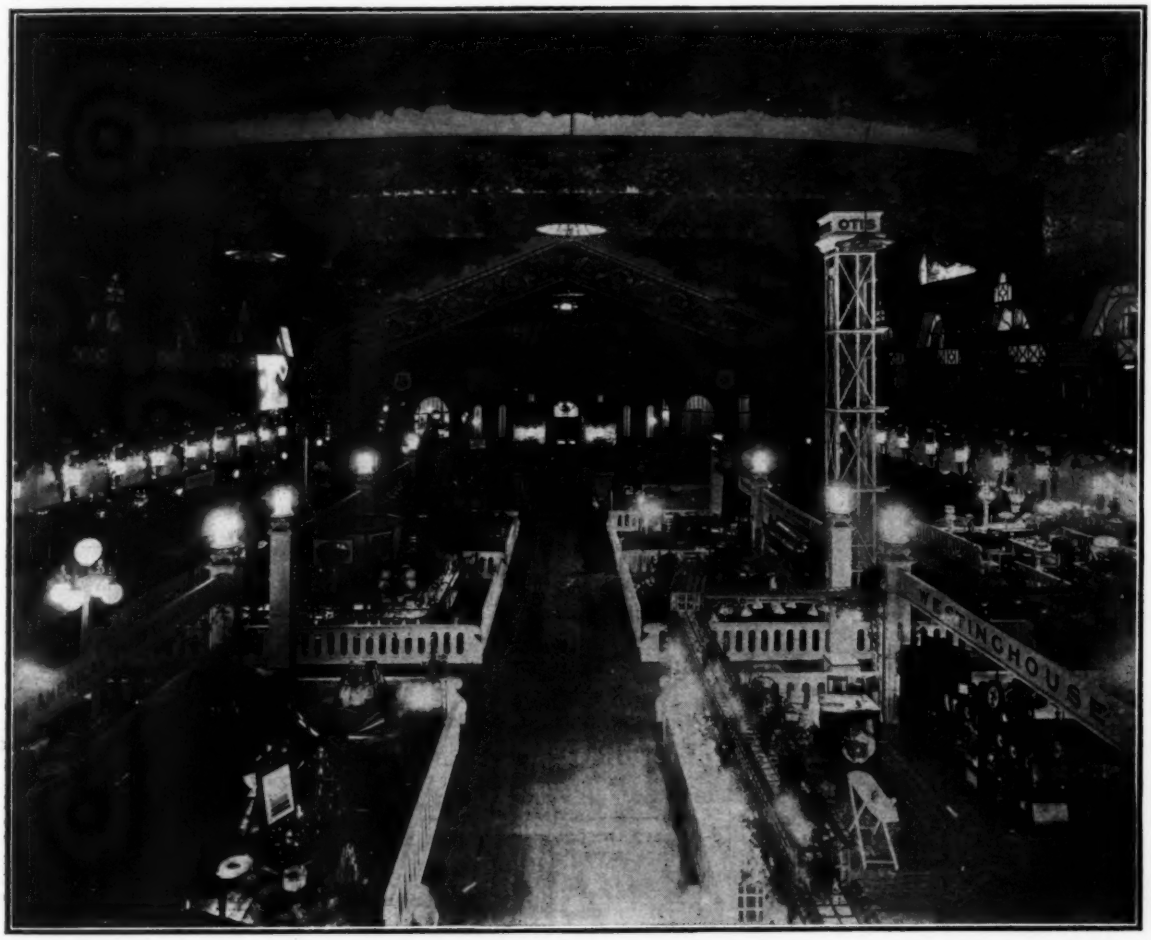
Boston Insulated Wire & Cable Company, of Dorchester, Mass., ex-

transformers, automatic eight-day and one-day time switches, thermo sign flashers and tungsten lamps. The company is represented by L. E. Gott.

Century Electric Car Company, of Detroit, Mich., shows its pleasure cars.

W. H. Colgan Company, of West Newton, Mass., shows a line of "Rex" specialties, including switch boxes, switch bases, outlet bases and covers, theater receptacles, etc. C. H. Florance is in attendance.

S. B. Condit, Jr., and Company, of Boston, show a complete line of "Arrow" switches and sockets; Safety Armorite Company's material; "Alphaduct" and Thomas & Betts fittings.



A View From the Other End of Grand Hall.

Automatic Transportation Company, of Buffalo, N. Y., shows an electric truck for warehouse, wharf and depot uses, and also a truck for use in hauling coal. Lee H. Long and John J. H. Ross are in attendance.

S. R. Bailey & Company, Incorporated, of Amesbury, Mass., is showing a roadster, a phaeton and a patrol wagon. P. H. Whiting, G. W. Langdon and Mr. Codman are in attendance.

Baker Motor Vehicle Company, of Boston, exhibits two of its pleasure cars—a Brougham and a Victoria. A. F. Neale is in charge.

Berger Manufacturing Company, of Boston, exhibits the "Tuec" stationary air cleaning system manufactured by the United States Electric Company,

hibits "Boston" wire and cable. T. H. Smith is in charge.

Buffalo Electric Vehicle Company, of Buffalo, N. Y., exhibits three of its pleasure cars. F. A. Babcock, Jr., is in charge.

A. S. Campbell Company, of Boston, demonstrates its "Cello" metal hot-water bottles and its line of "Cello" lighting devices for automobiles and marine purposes. A. S. Campbell is in charge.

Campbell Electric Company, Lynn, Mass., is showing a complete line of X-Ray and high-frequency apparatus, including the new "Sure X interrupterless" transformers. Also portable coils for X-Ray and therapeutic use. Low-voltage transformers, bell-ringing

There is also shown Orangeburg fiber conduit.

Conduit Electric Manufacturing Company, of Boston, is showing a complete line of protective devices, including the following: Direct-current and alternating-current carbon-break circuit-breakers, oil switches, switches for switchboard work ranging from 110 to 6,600 volts; manhole switches, remote-control oil and carbon-break switches, switchboard accessories and a line of transformers. With these are also shown a complete line of Chase-Shawmut fuses and fuse specialties. Representing both the company and the S. B. Conduit Company are C. C. Badeau, A. C. Nelson and Emery Horton.

Copeman Electric Stove Company,

of Flint, Mich., shows its automatic electric cook stove in the heating and cooking devices section of the Edison Illuminating Company's booth.

Clark & Mills Electric Company, of Boston, demonstrates the "Vacuna" vacuum cleaners.

Cryptofil Chain Company, Boston, exhibits the "Cryptofil" chain for supporting lighting fixtures. This is a new product, exhibited here for the first time, in which the wires are concealed in the links of the chain. F. S. Alden is in charge.

Dearborn Drug & Chemical Works, of Chicago, has a nicely furnished booth that is used as a reception room. P. H. Hogan is in attendance.

Dennen & Hall, of Boston, exhibits the "Easy" electric washer. E. M. Dennen and R. G. Hall in attendance.

Ward Drouet & Foster, Inc., of Boston, show the following lines: Crocker-Wheeler motors, generators and transformers; Delco heating and cooking devices; Bissell sewing-machine motors and vacuum cleaners; Steel City Electric Company specialties; Weber sockets; Adams-Bagnall flaming arc lamps; Edwards' bells, and Hubbell specialties.

John Dugdill & Co., of Failsworth, Manchester, England, is exhibiting apparatus made under Mr. Dugdill's patents and including adjustable brackets, desk and pendent lighting fixtures, etc. Mrs. Dugdill is in attendance.

Duren & Kendall, of Boston, are exhibiting Santo vacuum cleaners and Apex washing machines.

Duntley Products Company, of Erie, Pa., shows Duntley vacuum cleaners. J. W. Lockerbie is in charge.

Economical Electric Lamp Company, of New York City, is exhibiting "Hylo" lamps. Represented by M. Lobenthal.

Edison Storage Battery Company, of Orange, N. J., has on exhibition a complete line of "Edison" batteries, from 40 ampere-hours capacity to 450; open exhibition cells and assembled elements; sample or show boards showing progressive operations from raw material to finished battery parts; automatic alternating-current rectifier and automatic controllers for yacht or isolated plants. The special processes in the manufacturing of the Edison battery are illustrated in detail by working machinery, including plating of flake, separating flake, drawing, seaming and swedging of positive tubes and filling and tamping of same. An absolute short-circuit and a vibration or bumping test is also demonstrated. R. A. Bachman and Charles Edison are in attendance.

Thomas A. Edison, Inc., of Orange, N. J., gives demonstrations of the Edison phonograph in a hall provided for that purpose. In a section representing a home is shown the new kinetoscope for use in homes. Also shown are professional kinetoscope, primary batteries and dictation machines. H. R. Skelton is in attendance.

In the Appliance department booth of the **Edison Electric Illuminating Company,** of Boston, are included Schweitzer & Conrad fuses, "Reco" electric flashers, Goettman toy transformers, Hoskins electric furnaces, Domestic washing machines, Brokaw-Eden washing machines, Cadillac heating device and Victor surgical apparatus.

Electric Blower Company, of Boston, exhibits a line of its motor-driven fans and blowers.

Electric Speedometer Company, of Boston, shows the Hopkins electric tachometer.

Electric Storage Battery Company, of Philadelphia, shows single cells of the "Exide," "Hycap-Exide," "Thin-Exide" and "Ironclad-Exide" batteries for electric vehicles. These cells are made up with the sides cut away so as to show construction and method of assembling. The company also shows cells of "Hycap-Exide" batteries such as are being used for street-car operation by the Third Avenue Railway Company, of New York City, a cell of type H. 77 Exide standby battery as used by the Edison Illuminating Company, of Boston, is shown completely equipped. Types of "Exide" batteries for automobile lighting and for self-starters are exhibited; and display boards show "Chloride Accumulator" and "Tudor Accumulator" plates for different classes of service. Also shown are samples of various battery parts and accessories used in connection with the operation of storage batteries. The company is represented at this show by Frank J. Stone, manager of the Boston office, and L. C. Kerrick and T. P. Bedford.

Electrical Testing Laboratories, New York portrays the varied character of the work done. An automatic projection lantern in one corner presents pictures of tests and test apparatus. A new type of photometer for incandescent lamps is presented for the first time, together with an apparatus for the checking of clinical thermometers. The great variety of tests undertaken at the laboratories is shown in an exhibit of tested materials which ranges from paper and coal to high-tension insulators. A special feature of this exhibit is an apparatus for the projection of the various commercial arcs used in lighting, the flame, carbon and magnetite arcs being projected side by side upon a screen. The Laboratories are represented by N. D. Macdonald and W. H. Rolinson.

Engineering Department of the National Electric Lamp Association, Cleveland, Ohio, has booths in the main exhibit hall. These booths lie on opposite sides of the main aisle, which is bridged by a pergola covering the exhibit space. To add to the attractiveness of the decorative scheme the exhibitors have placed a white metal dome, eight feet in diameter above the aisle between the booths. This dome is fitted with six 500-watt frosted Mazda lamps which illuminate the east end of the hall to a pleasing brilliancy. Several rather unusual pieces of display apparatus are shown within the exhibit space. A wheel fitted with white and blue 10-watt Mazda sign lamps on its outer rim, and bearing regular and round-bulb Mazda lamps on its inner rim revolves slowly, demonstrating the feasibility of burning Mazda lamps in any position. The sign lamps are flashed, simulating a rapidly revolving wheel. A meter apparatus which has the appearance of a grandfather's clock indicates the superior candlepower of a Mazda lamp over a carbon lamp of the same wattage. A display rack shows a complete line of regular, round-bulb and tubular Mazda lamps of the 110 and 220-volt classes. Miniature and low-voltage lamps ranging from the one-candlepower 2.5-volt flash lamp to the 30-volt round lamp are burned in a special display rack. A large question mark outlined with a bank of 10-watt frosted sign lamps is used as an inducement to visitors to peruse the literature which the exhibitors are distributing. Automobile lamps are also shown. The booth is in charge of F. J. Blaschke and R. W. Tavey.

Engineering School of Tufts College exihibits electrical apparatus such as is used in its testing laboratory and specimens of apparatus designed and built by its students.

L. Erikson Electric Company, of Boston, shows a line of its specialties and fixtures.

Fancleve Specialty Company, of Jamaica Plain, Mass., exhibits a complete line of the "Fancleve" specialties. J. Leonard Gleason is in charge, assisted by members of the sales staff.

Federal Sign System (Electric), of Chicago and New York, displays signs, flashers, vacuum cleaners, washing machines, electric power tables and a new line of electric heating devices. W. Warren Tower, J. A. Gibson, C. B. Graves and Samuel I. Levy are in attendance.

Flanders Manufacturing Company, Pontiac, Mich., is exhibiting all the parts of the Flanders car. H. A. Stevenson is in charge.

Flexlume Sign Company, of Buffalo, N. Y., exhibits a complete line of its Flexlume "one lamp a letter" signs. P. W. Mack is in charge.

General Electric Company, Schenectady, N. Y., calls its exhibit the "Mazda Castle." In the court yard are the larger exhibits of industrial apparatus, while household appliances, etc., are located inside the "castle." One section of the exhibit space represents a model machine shop, showing the application of motors to various machine tools. The shop is operated by apprentices from the Lynn works of the company. The lamp manufacturing exhibit consists of demonstrations of the complete processes involved in the manufacture of miniature tungsten lamps. The operations begin with the cutting of the glass tubes in the proper lengths and ends with the labeling and packing of the lamps. The exhibit also includes a complete line of motors, generators, fans, heating and cooking appliances and miscellaneous apparatus. The exhibit is in charge of R. A. Lewis.

General Motors Truck Company, of Pontiac, Mich., has on exhibition an English omnibus and a three-ton commercial truck. There is also shown the chassis of a one-ton truck which has traveled 15,000 miles without lubrication. G. W. Smith is in charge.

General Vehicle Company, of Long Island City, N. Y., has a large space in which five of its commercial trucks are shown, these being a five-ton brewery truck, a two-ton delivery wagon, a two-ton truck, a 1,000-pound delivery wagon and a one-ton truck for use in wharves, depots and factories. Day Baker, New England manager of the company, is in charge.

Gould Storage Battery Company, of New York, is showing through its Boston office a line of its storage batteries and parts adapted for car lighting, central-station work, automobile sparking and submarine purposes. Messrs. W. Walker and Clair are in attendance.

Goulds Manufacturing Company, of Seneca Falls, N. Y., shows its automatic-control power pumping machinery. Robert E. Hall is in charge.

Gray & Fiske, of Boston, show the

"Handy" adjustable lamp fixture. B. C. Gray is in charge.

Joseph E. Green Company, of Boston, shows the following: Wirt insulating joints, Moss lamp-guards, Freeman and Connecticut porcelain, Union switch boxes, Robbins & Myers fans and motors. Joseph E. Green and A. S. Hill are in attendance.

F. S. Hardy & Company, of Boston, exhibits Crouse-Hinds condulets, Globe washing machine, Erickson telephone, Vulcan heating device, Monarch vacuum cleaner, McGill lamp guards.

Haskins Glass Company, of Wheeling, W. Va., is showing semi-indirect lighting effects with Haskins "Lucida" glassware, including spheres; also a new line of cut and etched glassware for shower fixtures. The company's new departure in Tiffany and Iris glassware is also shown. A sample is shown of the Toronto system of street lamps for which the Haskins Company furnished the glassware. L. C. Siegel is in charge.

Hawley School of Engineering is exhibiting in full operation a number of motors and generators. The purpose of this exhibit is to show the practical operation of this machinery, which is of the kind that is used by the electrical classes of the school in their work. Calvin C. Stevens is in charge of this booth and a number of students of the school are in attendance, operating the apparatus.

Hill, Clarke & Company, of Boston, has an exhibit space under charge of A. Steadfast, and exhibits the following machines, each individually motor driven and in operation: Universal boring machine; Henry & Wright drilling machine; Milwaukee vertical milling machine; radial drilling machine; Flather lathe and a Whitcomb planing machine.

Holtzer-Cabot Electric Company, of Brookline, is exhibiting an automobile lighting dynamo and a variety of motor-driven machines. Douglas Cairns is in charge of the exhibit.

H. W. Johns-Manville Company, of New York, is exhibiting through its Boston office two small household refrigerating machines, of the Audiffren-Singrun type and is also showing a complete line of electrical supplies, including an Ebony asbestos-wood switchboard and an assortment of fiber conduit. The exhibit is in charge of E. R. Potter.

Kinetic Engineering Company, of Philadelphia, is exhibiting Kinetic electric organ blower in operation. S. A. Gould is representing the company.

Kinney Manufacturing Company, of Boston, shows its pump and air compressors in operation. In attendance are J. Royal Kinney and E. B. Neal.

C. S. Knowles, of Boston, shows the lines of his manufacture: H. K. outlets, "Zee" socket material, overhead railway material, cut-outs, pendant switches, push-button switches, rigid iron and armored flexible conduit. H. M. Sabin in attendance.

Lansden Electric Vehicle Company, of Boston, shows three commercial trucks.

Edwin C. Lewis, Inc., of Boston, shows a fine line of lighting fixtures, electric fountains, etc. W. H. Merrill and Edwin C. Lewis are present.

Fred T. Ley & Company, Inc., of Springfield, Mass., has an attractively fitted up booth which is used for reception purposes.

Lundin Electric and Machine Company, of Boston, shows a fine line of its various types of ornamental standards for street lighting, including trolley-pole brackets. E. O. Lundin and J. F. Beedle are in attendance.

Donald N. Macdonald, of Boston, Mass., displays a fine line of portable and semi-indirect lighting fixtures.

Massachusetts Institute of Technology exhibits in three separate spaces. One exhibit is in charge of Harold Pender, and shows a series of five charts treating Institute enrollment; number, location, and occupations of graduates; course of study in electrical engineering, showing by colored lines the time spent in each study of the course; various enlargements of laboratory views, etc. The second exhibit is in charge of F. A. Laws, and comprises a demonstration by five integrating wattmeters and various demand meters of the methods of testing prescribed by the Massachusetts Gas & Electric Commission. The third space is in charge of H. F. Thomson. Attractive arrangement of "Tech" banners and pictures of present buildings and suggested treatments of new site in Cambridge are shown.

McKenney and Waterbury Company, of Boston, is making a special display of "Equalite" glass embodying the "Equalite" system of interior lighting. Also shown are alabaster, onyx and marble pedestals surmounted by figures and vases with French silk shades. C. W. Martin is in charge with various members of the sales force in attendance.

Metropolitan Engineering Company, of Brooklyn, is showing its line of meter-protecting devices designed to prevent theft of current and facilitate testing of meters. Frank E. Brown is in charge, assisted by Fred P. Woodbury, who is demonstrating the company's net-work protection for high-tension lines.

John J. Meyer, of Boston, shows a line of Detroit Fuse Wire & Manufacturing Company's "Arkless" fuses and "Detroit" ironclad fused switches and motor starters; also a line of American Circular Loom Company flexible and rigid conduit.

Minerallac Electric Company, Chicago, shows its line of printometers, maxicators, maxometers, minerallac compounds, tapes, varnishes, Unity insulators, cable and conduit hangers and electroscopes. C. C. Lovejoy and E. Williams are in attendance.

Nelite Works of the General Electric Company occupy space just inside the main entrance, where there is shown a very handsome display of Holophane, Veluria, Iris, Pyro, cut glass, and a full line of steel reflectors for industrial lighting. This exhibit has been planned by and is in charge of Walter Jones, with H. C. Jones, W. R. Timper, Ray Adams, L. B. Foster, Messrs. Weeks and Max Griffin in attendance.

New England Telephone & Telegraph Company, of Boston, shows a 1,500-line multiple No. 4 private-branch exchange, giving service to exhibitors, also serving as an exhibit in itself. The company is also showing a full-sized model of concrete manhole as used in New England territory.

Old Colony Trust Company has set up a modern banking room in exhibition hall, where a regular banking business is conducted.

Otis Elevator Company, of New York, shows in operation one of its complete automatic passenger elevators. George Clifford is in charge.

H. T. Paiste Company, of Philadelphia, is showing a full line of its Paiste standard wiring material, including pipe "Taplets," sockets, switches, boxes, etc. A feature of this exhibit is a turnstile made of Paiste "pipe taplets" which lights as it is revolved. The company is represented by W. T. Thomas, W. W. Winship, W. L. Reader, Frank Booth and Charles J. MacLean.

J. H. Parker, of Boston, exhibits the following: A full line of porcelain made by the General Porcelain Company, a line of Dickinson molded electrical insulation, and Lovering molded battery boxes. F. S. V. Sias is in attendance.

Pettingell-Andrews Company, of Boston, has an attractive exhibit representing the rooms of a dwelling fitted up electrically. A fine line of lighting fixtures of the company's manufacture for homes are displayed and among other electrical devices exhibited are "Thor" washing machines, General Electric heating and cooking devices. Fred W. Cramphorn is in charge of the exhibit.

Frank N. Phelps, of Boston, exhibits three "Baker Electric" commercial vehicles. Frank N. Phelps, A. W. Waugh and R. D. Sampson are in attendance.

Philadelphia Storage Battery Company, of Philadelphia, is showing its line of automobile and ignition batteries and parts. R. C. Gregg is in attendance.

H. S. Potter and the **H. S. Potter Company,** of Boston, have a joint exhibit space. In the H. S. Potter section are included a line of Eck Dynamo & Motor Company's generators and motors; also automatic air pumps, sewing machine motors and Betts & Betts sign flashers. H. S. Potter Company are New England distributers of the Edison storage battery and in this section is shown the practical operation and application of the Edison battery. Included are an Edison alternating-current rectifier and an Edison voltage controller. In attendance are H. S. Potter, T. P. Driver and G. W. Holden.

Samuel L. Prentice, of Boston, shows the "Invincible" electric renovators. S. L. Prentiss and H. C. Woodbury are in attendance.

Pyrene Company of New England has an exhibit of the "Pyrene" fire extinguishers and gives demonstrations of its efficient work. Charles S. Davis, Jr., is in charge.

Rauch & Lang Carriage Company, Cleveland, exhibits three new model pleasure cars. J. W. Hathaway is in charge.

Frank Ridlon Company, of Boston, is showing a line of supplies for street railways and specimens of repair work done at this company's shop. C. J. O'Brien is in charge.

Robins Conveying Belt Company, of New York City, shows a working model installation of its conveying machinery with photographs of some of its large installations.

Simplex Electric Heating Company, of Cambridge, Mass., is exhibiting a complete line of "Simplex" heating and cooking appliances, including six sizes of electric ranges, and is also demonstrating them in use. In attendance are C. D. Williams, H. F. Holland, C. E. Preble and R. C. Libbey.

Stone & Webster Company, of Boston, has an exhibit space fitted up as a reception room on the walls of which are displayed photographs of some of the power projects built by this company.

Stuart-Howland Company, of Boston, exhibits the following lines: Benjamin lighting units, Excello flaming arc lamps; "Hot-Point" heating devices; New Haven switches; Dietz washing machines; Pittsburgh insulators; Gilette-Vibber outlet caps; Oliver line material and Daylight arc lamp. E. J. Voye is in charge.

Studebaker Corporation, of South Bend, Ind., is showing a two-ton stake body and a 1,000-pound express body. Harry R. Kelley is in charge.

Toledo Electric Welder Company, of Cincinnati, O., is demonstrating its process of electric welding and exhibiting specimens of the work done by this process. A. V. B. Cutler is in charge.

The Underhill Company, of Boston, shows a "Grinnell" pleasure car.

Ohio Electric Car Company, of Toledo, O., shows one of its town cars. H. L. Converse is in charge.

United Electric Apparatus Company, of Boston, is exhibiting its line of electric railway signaling devices. A. A. Ziegler is in charge.

Wagner Electric Manufacturing Company, St. Louis, Mo., has an exhibit in charge of the Boston office, of which Brooks Faxon is manager. The exhibit includes single-phase motors, polyphase motors, transformers, switchboard and portable instruments, alternating-current converter and small alternating-current rectifiers. A feature of the exhibit is a demonstration of the unity-power-factor single-phase motor.

Walker Vehicle Company, of Chicago, is exhibiting two-ton, 1.5-ton, 1,000-pound and 750-pound commercial electric trucks. J. W. Emery and Ernest Lunn are in attendance.

Waterbury Company, New York, is showing a working exhibit demonstrating the manufacture of wire. The process shown includes the mixing of the compound for insulation, insulating the wire, panning the wire for vulcanizing, and braiding. A. D. Stein is in charge of the exhibit.

Western Electric Company, of Chicago, exhibits various electrical appliances and some of the machinery of its manufacture, including telephone apparatus, pole-line hardware, arc lamps, motors, transformers, fans, washing machines and numerous other articles of an electrical nature to take care of every electrical need. A feature is the "Sturtevant" vacuum cleaner which is shown in several types. The entire building is also equipped with Western Electric loud-speaking telephones through which announcements and musical numbers are transmitted. H. B. Gilmore, W. F. Abely and D. A. Chase are in attendance.

Westinghouse Electric & Manufacturing Company and the **Westinghouse Lamp Company** are represented in the same booth. Beginning at the right of the exhibit is displayed for the first time in Boston a complete line of improved direct-current and alternating-current small motors, ranging in capacity from one-half up to one horsepower. These motors have recently been put on the market. A complete line of meters are mounted in full view on a two-panel switchboard. The general utility motor is also displayed. Nine of these motors, with as many different attachments, occupy one large counter and are all in operation. Of most interest, perhaps, to the general public, is the extensive display of electric heating devices made by the company. This line embraces the electric iron, the toaster stove, coffee percolator, disk stove, chafing dish, air heater, frying pan, luminous radiator, heating pad, tailors' irons, chocolate warmer, milk warmer, instrument sterilizer, glue and solder pots, etc. Competent lady demonstrators are on hand to explain the operation of these various devices and endeavor to show everyone their simplicity and utility. Those in attendance are: S. St. J. Morgan, G. D. Bowne, W. W. Hall, G. C. Ewing, R. S. Twitchell, H. H. Van Staagen and F. J. Wellhouse, all of the Boston District sales office. F. W. Harrison, of the Westinghouse Department of Publicity, is in charge of the exhibit.

Wetmore-Savage Company, of Boston, exhibits a complete line of Trumbull panelboards, switches and cutouts, American Steel & Wire Company wires and cables; Bell Electric Manufacturing Company motors; Allis-Chalmers Company transformers; Sangamo meters; Stanley & Patterson battery cabinets; Everson vacuum cleaners; "Automatic" Electric washers; Simplex heating appliances, and Detroit electric fireless cooker. H. M. Savage is in charge of the booth and other members of the sales organization of this company and the manufacturers they represent are in attendance.

Wheeler Reflector Company, of Boston, shows a complete line of Wheeler reflectors for industrial and street lighting. Also a series of illustrated photographs, showing numerous installations of Wheeler reflectors. Russell Burrage is in charge.

Annual Steinmetz Meeting in Chicago.

The opening meeting of this season's series of joint meetings of the Chicago Section, American Institute of Electrical Engineers, and the Electrical Section, Western Society of Engineers, will be held as usual in Fullerton Hall, Art Institute, Chicago, the date being the evening of Monday, October 28. Charles P. Steinmetz will speak on "Some Problems in Electrical Engineering."

Program of New England Section Convention.

The fourth annual convention of the New England Section of the National Electric Light Association will be held in Boston, Mass., October 15, 16 and 17. Miss O. A. Bursiel, 149 Tremont Street, Boston, is secretary.

The Program Committee, of which A. F. Townsend, Woonsocket, R. I., is chairman, has arranged for the following papers to be presented at the various sessions: "The Education and Welfare of the Employee," by A. S. Nichols, will be read at the session on Tuesday morning; "Electric Protective Devices," by C. C. Badeau, will be presented at the afternoon session. At the session on Wednesday morning there will be a paper by E. M. Addis on "The Relation of the Central Station to the Prospective Customer," and at the afternoon session a paper on "Transmission-Line Construction," by R. D. Coombs. On Thursday morning papers on "The Development and Application of Electricity to Agriculture" and "Illuminating Engineering for the Central-Station Salesman," by C. H. Miles and R. Beman, respectively, will be presented. At the afternoon session a paper on "Co-operation Between the Central Station and Motor Manufacturer," by J. M. Tomb, will be read. The program also includes the President's Address on Tuesday morning.

On Tuesday evening there will be a dancing party and on Wednesday evening a visit will be made to the Boston Electric Show. On Thursday evening there will be a banquet, at which addresses by President Tait and Secretary Martin will be presented, and also a paper by L. J. Chase.

George C. Ewing, 201 Devonshire Street, Boston, Mass., is in charge of hotel reservations.

Rejuvenation of Sons of Jove in Philadelphia.

The last rejuvenation of the Sons of Jove in Philadelphia under the administration of Washington Devereux, statesman for that territory, will be held on Friday evening, October 11, at the Continental Hotel. The rejuvenation, which is scheduled for six o'clock, will be followed by a banquet at eight, at which numerous local and non-resident Jovians will speak. The committees having this affair in charge anticipate the most successful meeting in the history of the local order.

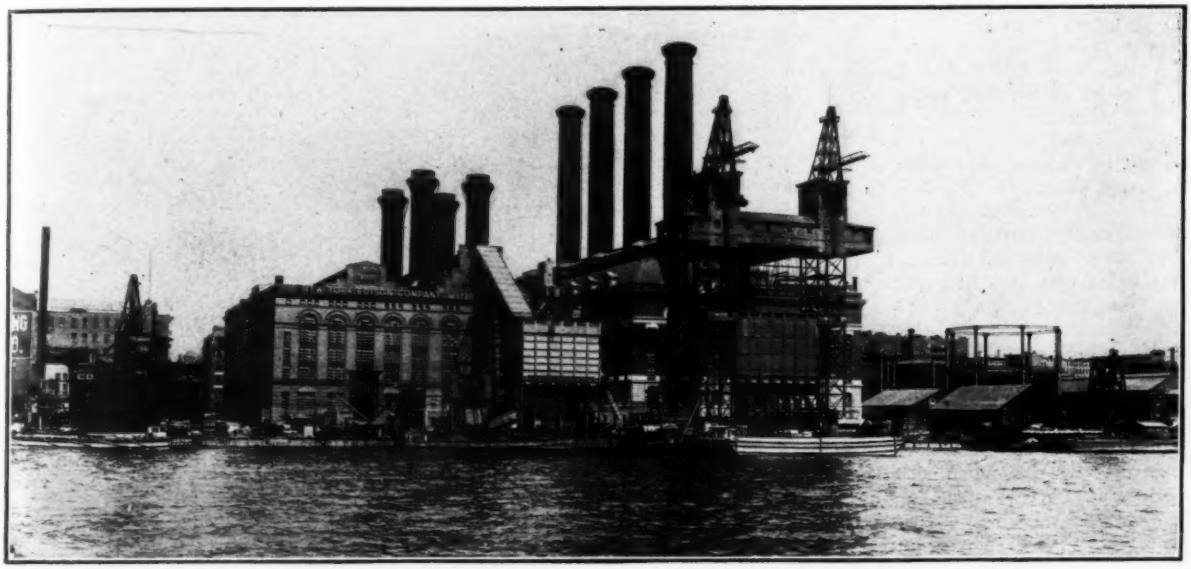
Electrical Measurement of Wind Velocity.

At the recent meeting of the British Association for the Advancement of Science, an instrument for the measurement of wind velocity was described by J. T. Morris. The apparatus consists essentially of a small Wheatstone bridge having two arms of manganin and the other two of platinum. The former has a negligible temperature co-efficient, while that of platinum is considerable. The bridge is constructed so that when cold it is out of balance, and the current is increased until the temperature rise of the platinum increases the resistance sufficiently to bring the bridge into balance in still air. If the instrument is placed in a current of air, the wires will be cooled, which does not affect the manganin wires, but lowers the resistance of the platinum; and to restore balance the current through it must be increased.

Thirty Years of Central-Station Service in New York City.

With the closing of the month just past, the New York Edison Company established a unique record for continuity of service and business development. In an old brick building in lower Pearl Street, New York, from a single generator of 125 horsepower, has been developed the great organization now serving not only the whole of Manhattan, but the Bronx as well.

When the Pearl Street station was placed in operation on September 4, 1882, the old Edison Company had 59 customers, with some 400 lamps. There was less than 15 miles of mains and feeders. Today the company's service is connected with 159,000 meters, and its mains and feeders, now under ground, amount to 1,292 miles. The area served is 22 times greater in Manhattan than was covered at the beginning, and also there are 40 square miles in the territory served in the Bronx. Approximately 5,215,000 lamps are on the company's circuits, aggregating 10,704,900 fifty-watt equivalents.



The New York Edison Company's Waterside Station, from the River.

Instead of the old brick building that housed the original generating apparatus there are now two Bastile-like structures that cover two city blocks, while 31 substations are required to convert the high transmission voltage to the low voltage for distribution; and the historic "Jumbo" of but 125 horsepower has yielded ground through a long line of descendants to a steam turbine of 30,000 horsepower.

The Edison Company of today is the successor of the company that under the personal direction of Thomas Alva Edison established the world's first permanent central station in a large city. Organized in December, 1880, it was known as the Edison Electric Illuminating Company and was the licensee of the Edison Electric Light Company which held Edison's electric light patents.

Steam boilers were installed in the basement of the reconstructed building at 257 Pearl Street and the generating units were set up on the second floor. These were the now historical "Jumbos," the first type of commercial generating machines in the world. They were six in number, and each was driven by an engine of 125 horsepower. Prior to those for the Pearl Street station, generators of a similar type had been constructed in Edison's Goerck Street manufacturing plant and shipped to London and Paris.

During the summer of this same year the underground distribution system was planned and laid out, and the wiring was installed in the buildings of prospective customers. The wiring of these buildings, the laying of the street mains, and the installation of the generating apparatus was all done under the personal supervision of Mr. Edison.

At three o'clock on the afternoon of September 4 the current generated by one of these sturdy Jumbos was turned into the mains and to the buildings of the "first customers."

This station and the six Jumbos continued operations until January 2, 1890, when fire destroyed the building. Only one dynamo, No. 6, was saved, and that only because it was near a window, and firemen playing their hose from the elevated structure were able to confine the flames to the rear of the floor. That fire put the lighting system out of business for less than half a day, because the Liberty Street annex, opened in 1887, was able to take up the load and by placing certain restrictions on the use of current, carry the burden until new machinery could be installed at Pearl Street. In 1890 another annex to the Pearl Street station was opened in the Produce Exchange Building.

In the meantime the new Duane-Pearl Street station, the fourth that had been built to meet the increasing demands for electric light, had been completed, and in 1895, the old station, outgrown and out of date, was dismantled and sold. Old No. 6 having yielded to machines of greater power and more modern design, was placed on the pension roll and is now treasured by The New York Edison Company as a relic of the early days of the lighting industry.

With the exception of this and one other interruption, aggregating together less than twelve hours, Edison Service has been continuous in New York since the day the first dynamo was started—a remarkable fulfillment of the inventor's prophecy that "the service would go on forever unless stopped by an earthquake."

The incorporators of the original Edison Company were: Tracy R. Edson, James H. Banker, Robert L. Cutting, Jr., E. P. Fabbri, who was J. Pierpont Morgan's partner; J. F. Navarro, also connected with Drexel, Morgan & Company; Grosvenor P. Lowry, and Nathan G. Miller. The

first meeting for the election of officers was held on December 20, 1880, the following directors being present: Tracy R. Edson, Henry Villard, S. B. Eaton, E. P. Fabbri, R. M. Gallaway, James O. Green, Nathan G. Miller and Robert L. Cutting, Jr., Norvin Green, afterwards president of the Western Union Telegraph Company, was chosen for president of the Illuminating Company, with Calvin Goddard as secretary and E. P. Fabbri as treasurer.

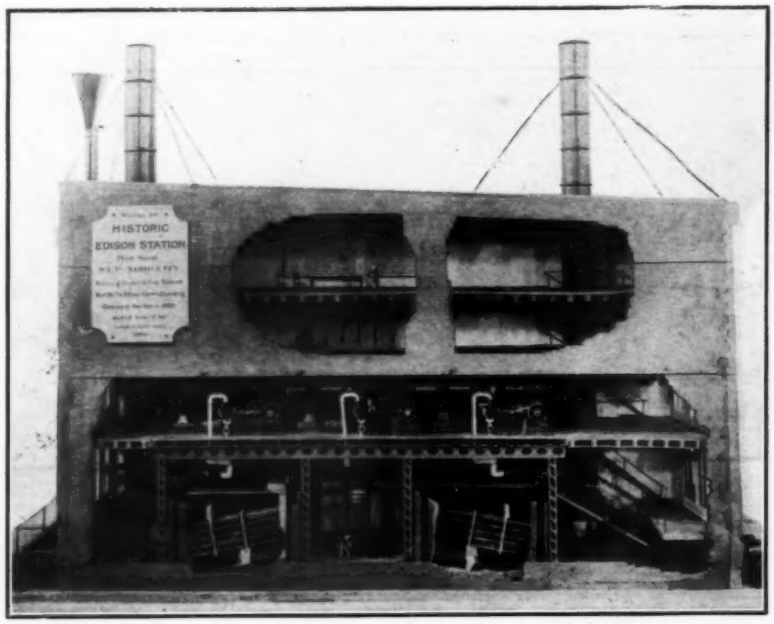
On March 23, 1881, S. B. Eaton was elected vice-president of the Edison Electric Illuminating Company and at the directors' meeting, held on December 16 of that year, Thomas A. Edison was "appointed engineer."

The board of directors responsible for the purchase of the original Pearl Street property included: Norvin Green, S. B. Eaton, J. F. Navarro, Grosvenor P. Lowry, Nathan G. Miller, Thomas A. Edison, E. P. Fabbri, Henry Villard, Robert L. Fulton, Jr., James H. Banker, Calvin Goddard, and William H. Meadowcroft.

Among the men now living who worked in various ways prior to 1884 to bring about the Edison system, either in its experimental stage or in its introduction and early development, were E. H. Johnson, one of Edison's lieutenants who also had much to do with the introduction of the Edison system into England; Charles L. Clarke, who had charge of the engineering affairs of the Edison Electric Light Company and the Edison Electric Illuminating Company, and who is now with the General Electric Company; S. Bergmann, now influential in electric work in Berlin; Francis R. Upton, for many years manager of the Edison lamp factory; S. B. Eaton, once president of the Edison Electric Light Company and of the Edison Illuminating Company; Samuel Insull, Edison's secretary in 1881 and manager of his business for many years, and now president of the Commonwealth Edison Company; John W. Lieb, Jr., now vice-president of the New York Edison Company; W. J. Hammer, who is now interesting himself in aviation; W. S. Andrews, now of the General Electric Company; T. C. Martin, secretary of the National Electric Light Association; F. J. Sprague, of motor and street-railway fame; John W. Howell, now technical engineer of the General Electric lamp works at Harrison; W. S. Howell, of the Electrical Testing Laboratories; J. H. Vail, now in the electric automobile business; H. S. Campbell, superintendent of the Second District of the New York Edison Company; Robert T. Lozier, of Kountze Brothers; Charles L. Edgar, president of the Boston Edison Company; Charles S. Bradley; Charles Wirt, at present engaged in electrical manufacture; Charles L. Eidlitz; C. E. Chinnock, who is still busy in electrical work; W. J. Jenks, of the General Electirc Company; F. S. Hastings, one time secretary of the Edison Electric Light Company; H. M. Byllesby, who in 1881 was in the engineering department of the Edison Electric Light Company, now president of H. M. Byllesby & Company, Chicago; Ernest J. Berggren, now at the Edison laboratories in Orange; A. S. Huey, now vice-president of H. M. Byllesby & Company; E. G. Acheson, the inventor of carborundum, whose factories are at Niagara Falls; Joseph Hutchinson, now interested in advancing the use of storage batteries in Canada; Richard N. Dwyer, who for many years acted for Edison in patent matters; and Francis Jehl, who did much of the testing of early meters, now of the General Electric Company of Budapest.

Many other people have been associated with Edison, but they perhaps began their connection with him after work on the incandescent light had been completed, or left him before it was undertaken. Others, too, have died, chief among them Charles Batchelor and John Kruesi, two of Edison's most trusted assistants.

On October 1, 1882, the old company had 59 customers connected; December 1, 1882, 203 customers; January 1, 1883, 231 customers. In February,



Model of Historic Pearl Street Station of the New York Edison Company, Built in 1882.

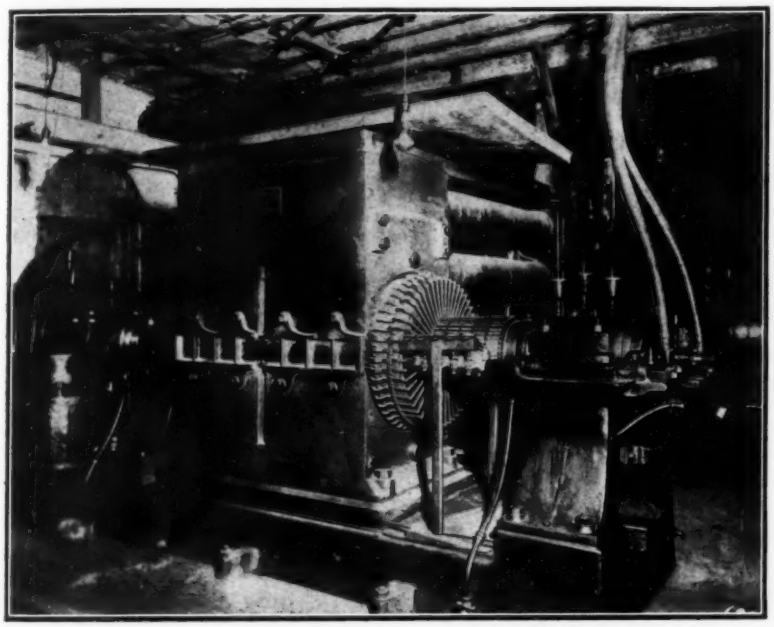
George Foster Peabody; James C. Hipple, now manager of the Lamp Works at Fort Wayne; Sydney B. Payne, now with the General Electric Company at Boston; M. A. Brock, now manager of the electric station at Paterson, N. J.; Henry M. Doubleday; William H. Meadowcroft, now assistant to Edison at the Edison laboratories in Orange; W. H. Francis, now of the Edison Electric Illuminating Company of Boston; John I. Beggs; W. E. Freeman, assistant treasurer of the New York Edison Company; John F. Ott, who has been with Edison 42 years; Fred Ott, who has a record of only four years less; Peter Weber, formerly with Bergmann, now at the laboratories in Orange; Fred A. Scheffler, of the Babcock & Wilcox Company; J. C. Walker; John W. Lawson; S. D. Mott; N. K. Iwadari, who took the first Edison lights to Japan; George G. Grower; Montgomery Waddell; C. F. Hanington; 1883, the company began to charge for current, a month or two later establishing a system of regular monthly meter readings and bill collections. One year after the opening there were 455 customers, with 11,192 lamps. It is recorded that the first year showed a loss of $4,457.50. In 1884, however, the company found itself with a profit of $35,554.49. In 1884 two more dynamos were added to the Pearl Street station, and the superintendent reported that the station could not handle the demand, and that there were over 100 applications on file.

An annex station was built in 1886, with a capacity of 2,000 lamps, at 60 Liberty Street. The 39th Street station began to supply current on Thanksgiving Day, 1888, and on the following Christmas Day the 26th Street station was started. These two stations were of fireproof construction, supplying jointly 200,000 incandescent lamps. In

dynamos, each of 600 amperes capacity. These stations were connected to the new underground system on the "three-wire" distribution then coming into vogue. In the Spring of 1889 the first low-tension arc lamps were connected with the uptown system.

In 1892 the net earnings were $475,137.61; there were over 4,344 customers; 142,492 incandescent lamps; 1,637 arc lamps; a power load of 3,807 horsepower. The three-wire system of mains and feeders was extended to 165.22 miles. In that year the Fifty-third Street station was opened.

Early in 1902 the first Waterside station was opened. There were 16 vertical engines, each of 8,500 horsepower.



One of the Original "Jumbo" Dynamos in the Pearl Street Station of the New York Edison Company.

At the beginning of 1902 there were 595 miles of underground mains and feeders, serving 1,867,422 fifty-watt equivalents. In 1906 the second Waterside station was opened, with a capacity of 103,000 kilowatts. The Waterside stations occupy two city blocks on the East River front and have a capacity of approximately 700,000 horsepower. Through some 1,300 miles of cable, which connect the 31 substations with Waterside and interconnect the substations each with the other, current is now supplied in New York. 5,245,000 incandescent lamps are lighted, there are 40,400 arc lamps on the system and 337,800 horsepower in motors, while 159,000 meters are required to measure the current. The Edison system covers practically the entire island of Manhattan with its 21.93 square miles and the Borough of the Bronx which contains more than 40 square miles.

Commemorating this great development, the New York Electrical Show, which will be held at the new Grand Central Palace, October 9 to 19, will afford a splendid commentary on the advance which has been made in all electrical utilities since the birth of the original Edison Company. To this end the historical exhibit and the exposition of modern electrical devices of every description will offer every one interested an unparalleled opportunity for a close study of the past and present of electrical development.

BOOK REVIEWS.

"Shop Arithmetic." By Earle B. Norris and Kenneth G. Smith. New York: McGraw-Hill Book Company. Cloth, 180 pages (6x9 inches), illustrated. Supplied by the Electrical Review Publishing Company for $1.50.

Written by two instructors of the Extension Division of the University of Wisconsin, this book fills a peculiar field, for unlike most arithmetics it is intended particularly for adults familiar with shop practice in the metal-working lines. To meet the needs of such men, the authors have based nearly all of their examples on problems such as are met in actual shop practice. These include problems in Fractions, Multiplication and Division, Money and Wages, Decimals, Percentages, Circles, Ratio and Proportion, Areas and Volumes, Pulleys and Gears, and Square Root. Incidentally, the nature of the work permits of explanations for lack of which the average shop worker is usually handicapped. For instance the chapter on decimals concludes with a study of the micrometer; that on circles with problems on cutting speeds, pulley and belts; that on volumes with practice in estimating the weight of castings.

To make the book still more serviceable, the authors have added eight chapters covering matter usually included in the textbooks on mechanics or physics. This allows them to show the methods of figuring leverages, tackle-blocks, wedges and screws, the horsepower of belting and of engines, safe working stresses, etc. In some cases the writers have strayed from their subjects, as when treating of the grain and flesh sides of belting. On the other hand, such important items as wire gauges or as the relation of horsepower to kilowatts, have been entirely overlooked. With the steadily increasing use of electric light and power in shops, and with the rating of machinery by the required power, these items would seem to deserve inclusion even in a volume which aims to draw its illustrations from the metal trades. So, also, a brief reference to the metric system could easily have been included in the chapter on decimal fractions.

In a few cases, explanations are not entirely adequate—as when the symbol π is given without stating how it may be pronounced—but these instances are the exceptions. The 86 cuts are clear and well chosen. So also are the test problems, while a variety of tables make the volume one to which the owner may often refer.

ALBERT SCHEIBLE.

"Wireless Telegraphy and Wireless Telephony." By Charles G. Askley and Charles B. Hayward. Chicago: The American School of Correspondence. Cloth, 141 pages, (6¾x9¾ inches), illustrated. Supplied by Electrical Review Publishing Company for $1.00

This book is a very readable and interesting exposition of the arts of wireless telegraphy and wireless telephony. It is strictly non-mathematical and is written in a manner that is understandable by the lay reader or the amateur wireless experimentalist. In the main part of the book the authors take up in the proper sequence the early history of the art of wireless telegraphy, its fundamental principles, the rise and development to the present successful degree and explanations of the various systems in commercial operation. The early attempts at wireless telephony are described as are also the methods and apparatus used in the present-day practical systems. The final chapter is devoted to the application of wireless to aeronautics. The book is well written and well illustrated and is to be regarded as one of the best contributions to the literature of the subject suitable for the average reader, whether he has a technical knowledge of electrical subjects or not.

G. E. MARSH.

New Electrical and Mechanical Appliances

Benjamin Car Fixtures.

The two illustrations herewith (Figs. 1 and 2) show a new type of single-unit ceiling car fixture manufactured by the Benjamin Electric Manufacturing Company, Chicago. Fig. 1 gives a good general view of this fixture, which can be used with any kind of glassware fitting a 2-25-inch holder. The shade or reflector is securely held in position by a special safety holder, in which the three customary screws

Fig 1.—Single-Unit Car Fixture.

are replaced by three spring clips that are forced into engagement by a cam ring. This is bolted to the casing so that it cannot jar loose.

A two-piece porcelain receptacle with special lamp grip secures the lamp against loosening or falling. Fig. 2 shows two ways in which the receptacle may be attached to the car ceil-

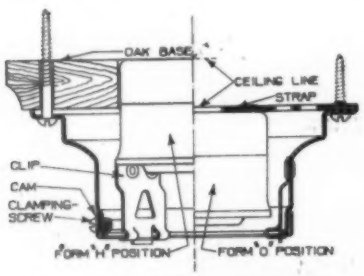


Fig. 2.—Two Methods of Mounting.

ing. The form H mounting shown at the left provides for direct connection to the ceiling through an oak base block. The form O mounting shown at the right is by means of a strap.

Each fixture embodies the Benjamin lamp grip shown in Fig. 3. This is a simple spring device that engages the lamp base with sufficient force to prevent the gradual loosening and ultimate falling out of the lamps due to the continual vibration of the car while in service. It not only protects against loss of lamps but against possible damage to passengers from falling lamps.

A Fog-Screened Ventilator.

To the American who is unaccustomed to the dense fogs of London and other English cities, the idea of attaching fog-screens to electric fans may seem rather amusing. Yet the very fact that the dense fogs interfere with proper indoor working conditions if the windows are opened to admit the same has led to a practice decidedly in advance of that with which we are familiar in this country. Here we commonly use electric fans as adjuncts to open windows through which the air may enter with its full quota of dust and smoke. We rejoice at the ventilation, having not yet learnt that we can get the same free from the objec-

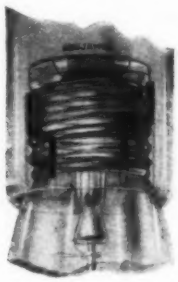


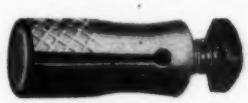
Fig. 3.—Benjamin Lamp Grip.

tionable dirt and smoke by keeping our windows closed and interposing suitable screens or filters between the fans and the outer air.

And yet the fans may be just as efficient when not producing the objectionable drafts and when introducing only the purified air. In one case such a fan is said to introduce over 6,500 cubic feet of air per hour while running noiselessly on 24 watts, and without disturbing papers on the desk by any draft. It is made by James Keith and Blackmon Company, 447 Halloway Road, London, England.

The New Van Expansion Bolt.

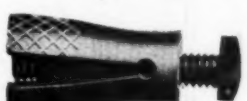
A new type of expansion bolt has been placed on the market by the Van Expansion Bolt Manufacturing Company, Fort Dearborn Building, Chicago. Electrical engineers and contractors have found this bolt to be easily and quickly inserted in concrete, brick, stone, etc. The accompanying illustrations show the expansion shell in a normal state and partially expanded. This shell obtains its great holding power by means of a cone so designed as to increase the expansion of the shell with increased strain on the bolt or screw to be held. The shell is composed of a flexible composition metal



Van Expansion Bolt Ready for Insertion.

and the tougher hard metal cone inside, drawn up by a machine screw or bolt, causes the flexible shell to expand at exactly the point where the greatest resistance is required, namely, the bottom of the hole. The slight curve or arch in the shell strengthens it and this curve, reinforced by the cone inside, prevents the shell from breaking.

The shell and cone are automatically machine cast in polished steel dies. This process does away with fins or projections. A temporary seal of tin, placed on the bottom of the shell prevents dirt from clogging the threads of the cone and eliminates the possibility of twisting off the bolt or screw heads. The simplicity of this expansion bolt makes it easy to install. There are no loose parts to it, on account of the cone fitting perfectly into the shell. V-shaped grooves on the cone prevent its turning. The tin disk on the bottom besides keeping dirt out of the shell, holds the



Van Bolt Partly Expanded.

cone firmly in position, making the threading of screw or bolts easy and certain. The makers claim it is impossible to break or loosen this shell-cone combination when in place, because the flexibility of the shell prevents breaking and because of the larger contact with the surface of the hole prevents loosening.

A New Switch Box.

To meet the demand for a simple and efficient switch box, the George Cutter Company, 407 Notre Dame Street, South Bend, Ind., has recently developed and placed on the market the A-W switch box which is made of cast iron and of such a construction that it is easily installed. By driving a nail into the studding where the box is to be located, slipping the slotted lug over this nail and then by pushing the box back so that the front lug is flat against the studding and driving a nail through it, the box is secured firmly in place and it is claimed that no amount of rough or careless handling can ever put it out of shape. It is claimed that an average of 30 minutes' time is saved on every box installed.

Fig. 1.—George Cutter Switch Box.

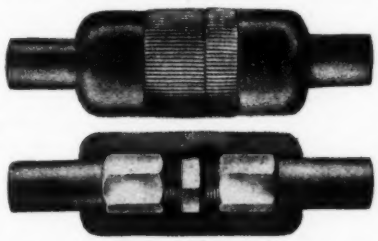
Fig. 2.—Method of Mounting Box.

Fig. 1 shows a front view of the box and Fig. 2 shows one method of supporting it. A slotted lug at the back holds it rigid and "true" perpendicularly, while another lug at one side of the front holds it firmly in place and does away with all need of cross pieces, etc. In addition to these features, the box has knockouts for either loom or for B.X. and conduit.

The box, being made of cast iron, is practically rust proof, and since it embodies the foregoing principles, it is apparent that this box will be found highly desirable by the electrical contractor and wireman doing any kind of installation work requiring switch boxes.

New Insulating Cover for Dossert Cable Connector.

A special form of insulating cover for use on cable joints made with Dossert connectors has been placed on the market by Dossert & Company, 242 West Forty-first Street, New York, N. Y. This cover is applicable only to connectors for jointing conductors ranging in size from No. 0 B & S gauge to 250,000 circular mils. The general construction is shown by the cross-sectional view. It differs from the insulating covers furnished for connectors used with wires smaller than No. 0 B & S in that it is held in place by means of shoulders at the outer ends of the connector instead of at the center. The covers, as shown, are made in two parts with a threaded coupling. The openings for the conductor range from 25 to 29 thirty-secondths of an inch, thus accommodating various thicknesses of insulation. The manufacturers state that other sizes will be added as occasion requires.

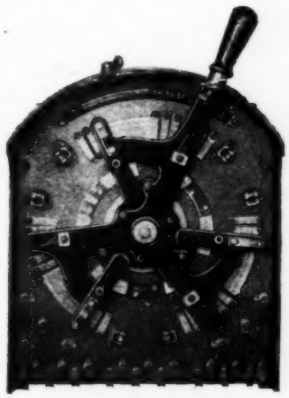


Dossert Insulating Connector Covers and Section Thereof.

Carpenter Type of Printing-Press Controller for Alternating-Current Service.

Carpenter type controllers have long been widely used in printing establishments for the control of flat-bed presses driven by direct-current motors. For use where alternating current only is available the Carpenter type controller, illustrated in the accompanying view, has been developed and placed on the market by the Cutler-Hammer Manufacturing Company, Milwaukee, Wis. It is suitable for the speed control of slip-ring induction motors driving printing presses, machine tools, etc. These controllers provide for seven forward speeds and two reverse speeds. They are suitable for either three-phase, three-wire or two-phase, three-wire or four-wire motors having rotors with secondary current not exceeding 60 amperes per phase. Standard designs allow for 50-per-cent speed reduction under full-load conditions.

The resistance, except in the case of the 7.5-horsepower size, is all contained in one plate divided into three sections so that speed variations are obtained by inserting equal amounts of resistance in the rotor circuits. The Carpenter resistance plate can be installed under the press or machine without danger.



Printing-Press Controller.

The Lyhne Lamp.

A very serious defect of the common portable lamp equipped with parabolic or similar shade is that the powerful rays from the outfit are very frequently turned directly into the eyes of the user. To overcome this difficulty the Lyhne portable lamp has been devised and placed on the market by the Beers Sales Company, 1001 Broad Street, Bridgeport, Conn. This lamp is made up in various forms. The one illustrated is decorated for use in the home as a reading, piano or sewing lamp. It has a powerful parabolic reflector to concentrate the light. The most important feature, however, is the adjustable eye-saving shade that keeps the direct light of the lamp from the observer's eyes. The stem supporting the reflector is adjustable.

Lyhne Portable Lamp.

Characteristic Curves of the Ritter & Uhlmann Lighting Units.

In the last issue of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN appeared an illustrated article by Hans K. Ritter describing the new type of combined lamp, reflector and diffuser manufactured by Ritter & Uhlmann, of Basel, Switzerland. It will be remembered that the most striking feature of this combination is the special corrugated glass diffuser at the bottom of the unit which serves to completely diffuse the direct rays from the high-efficiency lamps used and give a large luminous surface of low intrinsic brilliancy. Since the article was published three characteristic photometric curves have been received which give an excellent idea of the sort of light distribution attainable.

Fig. 4 shows the candlepower distribution from a 100-watt tungsten lamp. Curve *A* gives the distribution from a bare lamp without accessories of any kind; curve *B* shows the distribution when a matted aluminum reflector is placed above the lamp; curve *C* shows the effect when the Ritter diffuser is added.

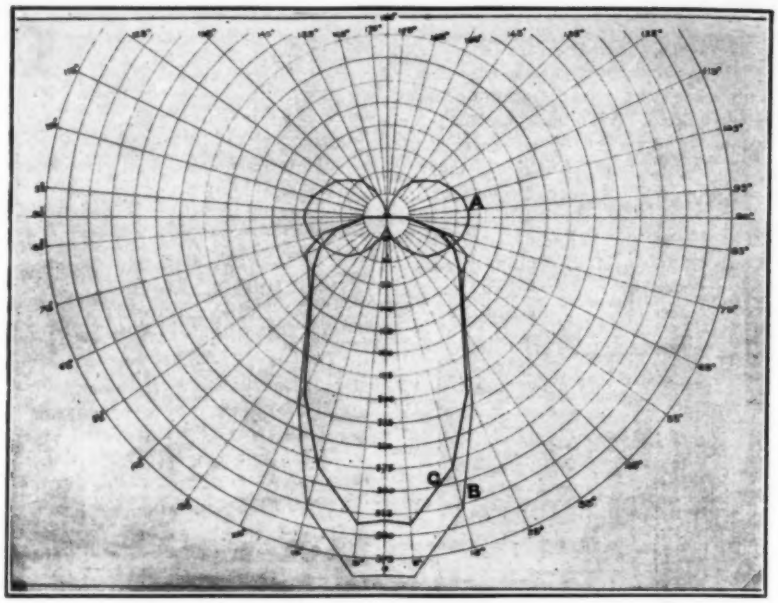


Fig. 4.

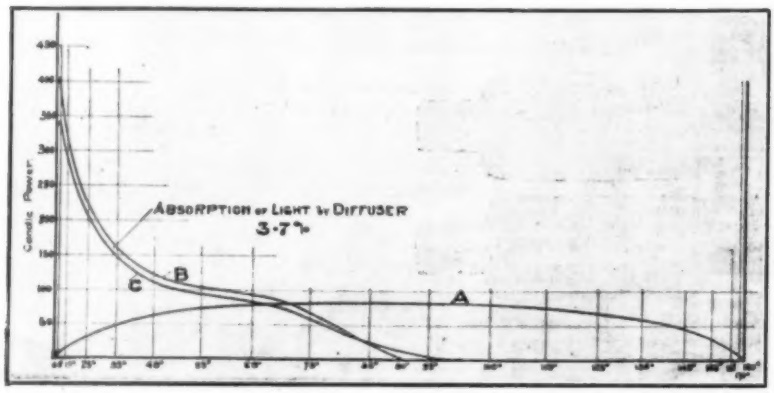


Fig. 5.

Fig. 5 is the corresponding Rousseau diagram which shows clearly that the absorption of light by the diffuser (the difference between curves *B* and *C*) is only 3.7 per cent.

Fig. 6 shows very strikingly the uniformity of illumination obtainable on a working bench lighted by a two-unit Ritter cluster with each unit placed 45 degrees with the vertical. The dotted curves *a* and *b* show the respective illuminations from each lamp as obtained by the point-by-point method. Curve *c* shows the very uniform combined illumination from both units, each of which contained a 60-watt tungsten lamp.

These fixtures are on sale in this country by Hans K. Ritter, 1017 Walnut Avenue, Niagara Falls, N. Y.

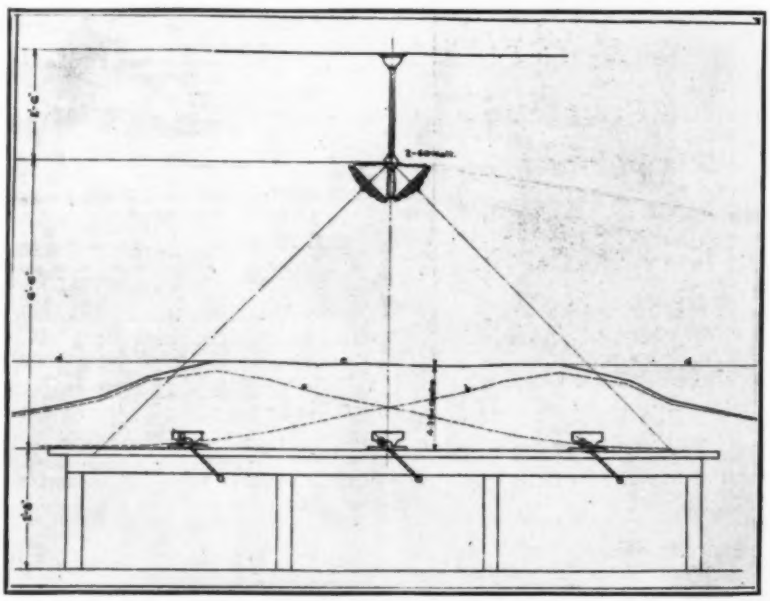


Fig. 6.

Largest Turbine-Driven Pump.

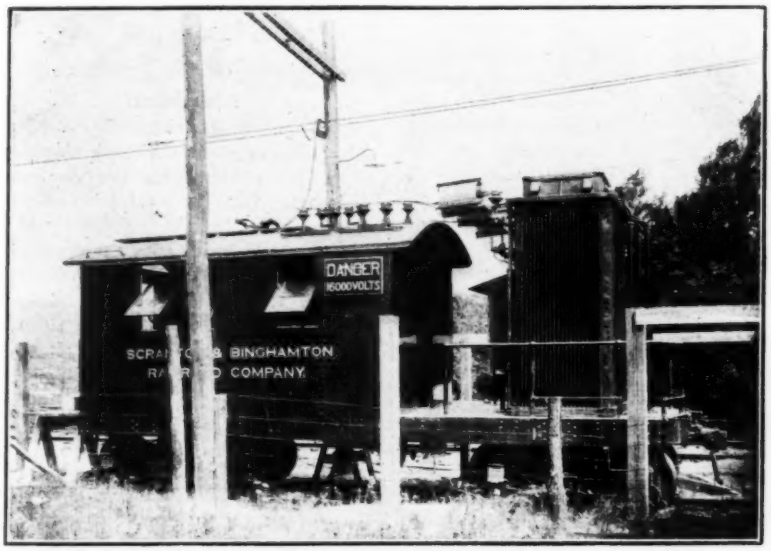
A steam-turbine-driven centrifugal pump having a capacity of 100,000,000 gallons per day is to be installed in the Ross pumping station of the Pittsburgh Water Works by the DeLaval Steam Turbine Company, of Trenton, N. J. This pump will be the largest steam-turbine-driven centrifugal pump ever built in this country, the rated capacity of 100,000,000 gallons per day against a total head of 56 feet amounting to over 980 horsepower.

This pump is guaranteed to show a duty of 115,000,000 foot-pounds per 1,000 pounds of dry steam, all steam used by the condensing equipment and other auxiliaries being charged to it.

Portable Substation with Outdoor Transformer.

A portable substation of a new design has been placed in service on the lines of the Scranton & Binghampton Railroad Company. The novel features are the use of an outdoor type transformer; the application of Burke horn-type switches; the general arrangement of the lightning protective apparatus; a device for leveling the rotary converter even when the car is standing on a decided grade; the low-tension cables between the transformer, switchboard and converter are carried under the car in conduit. Because of these features, the car is much shorter and lighter than the usual substation car; its length being but 27 feet.

The 440-kilowatt, three-phase, oil-insulated, self-cooling, outdoor type transformer is wound for 16,500 volts on the primary, and rotary voltage on the secondary.



Compact Railway Substation Car.

A Burke 100-ampere, high-voltage, air-break switch constitutes the high-tension control. The three movable horns of this switch are connected by bell cranks and may be actuated by a standard oil switch which is arranged for automatic operation and is mounted on the switchboard. The horn switch, however, severs the high-tension circuit automatically in case of overload. From the switch, the circuit passes through Burke horn-type fuses, which provide further automatic protection of the high-tension side of the transformer.

A standard Westinghouse low-equivalent arrester provides lightning protection. The arrester is supported between the transformer and the superstructure on a steel framework bolted to the transformer. An asbestos-wood casing completely incloses the arrester. The arrester is tapped to the high-tension circuit just ahead of the suspension choke coil, and the circuit passes down through disconnecting switches to the arrester.

A 400,000-circular-mil cable, specially insulated with varnished cambric and weatherproof braid, extends from the secondary of the transformer to the converter. The cable is carried in wrought-iron conduit under the car.

The rotary converter is a 400-kilowatt, 600-volt, 25-cycle, six-phase machine running at 750 revolutions per minute, and is equipped with an overspeed limit device. A leveling arrangement is provided by means of which the machine can be accurately alined when the car is standing on track at a grade as great as four per cent. There are four blocks of steel, each having one hole tapped through it. One of these blocks is fastened to the car floor under each corner of the converter. There are two bolts passing through the converter bedplate at each corner; one, a holding-down bolt, passes with clearance through the converter bedplate and turns into the tapped hole in the block; the other, a headless stud bolt, turns through another clearance hole in the bedplates; its lower end abuts against the plate and it has on it, just below the bedplate, a nut. By adjusting this nut, the corner of the machine can be raised or lowered as required, and since there is a similar bolt and nut under each corner, the converter can be accurately leveled. After leveling has been effected, the holding-down bolts are clamped down tight, retaining the machine in position.

Two black slate panels, mounted on an angle-iron structure bolted to the floor and braced to the side wall of the car, with a wing for the instruments, constitute the switchboard. The alternating-current panel carries the handle operating the high-tension switch and a triple-pole, double-throw knife switch for starting and running the converter. The direct-current panel carries a circuit breaker, a rheostat handle, a single-pole knife switch, and a voltmeter receptacle plug. All of the instruments, a direct-current voltmeter and ammeter and a power-factor meter, are carried on the wing.

All of the electrical apparatus in the substation car is of Westinghouse manufacture with the exception of the horn switches and fuses, which were manufactured by the Railway & Industrial Engineering Company, which concern designed and equipped the car. The car body was manufactured by the McGuire-Cummings Company, of Chicago and Paris, Ill., and is built entirely of steel.

A Valuable Book for Advertising Electric Ware.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has published a very handsome book devoted to Westinghouse electric ware, illustrating and describing modern electric devices for home comfort and convenience. The typography, paper, stock, illustration and text establish a standard of high quality, and the keynote of the publication lies in the following sentence, which is a prominent part of the introductory material: "An electric heating utensil is not worth buying unless it will measure up to the standard you set for your other table service. Westinghouse electric ware may be compared with your fine silverware in its style, fine workmanship and handsome finish. Heavily wrought from the best materials for the particular work, Westinghouse electric ware is bought for its quality and because it will be useful for years, and not merely because of convenience, safety and economy, it is the thing to use."

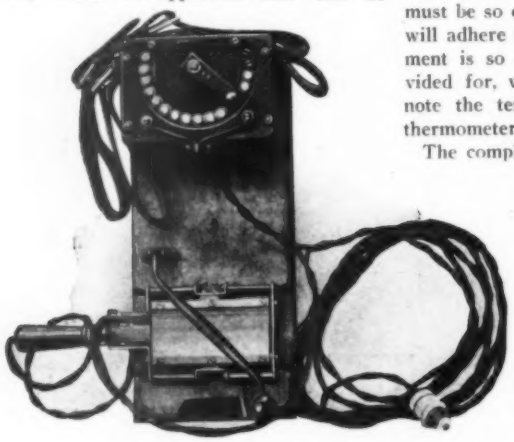
The text also brings to the attention of the purchaser the economy of the electric utility, explaining this in clear language and demonstrating that the electric toaster, requiring 500 watts, may be operated for a full hour for five cents, at a rate of ten cents per kilowatt hour. The heating pad, consuming 55 watts, may be operated for two full hours at a cost of but one and one-tenth cents.

Test of Edison Storage-Battery Train.

Completely successful tests have been made in the vicinity of West Orange, N. J., of a three-car storage-battery train developed by the Federal Storage Battery Car Company. Multiple-unit control was used for the first time on a train driven by batteries. Each car seats 40 passengers, and when fully loaded the train can operate at 30 miles per hour. Edison storage batteries are used. The train has been made for the United Railways of Cuba.

Electric Vulcanizer.

The efforts on the part of automobile manufacturers within the last few years to bring their product within the reach of a larger class of people by decreasing the price have resulted in a larger increase in sales and a more general adoption of the automobile for every use. However, the cost of upkeep and repairing is an item that is always considered, and one that often prohibits some people from enjoying that luxury. Hence, any article or apparatus that can be placed conveniently in the private garage and used for lessening the repair bill is considered advantageous to both manufacturer and the prospective buyer. Such a device is an electric vulcanizer, recently placed on the market by the Westinghouse Electric & Manufacturing Company, which can be used on either direct-current or alternating-current circuits.



Electric Vulcanizer Outfit.

The vulcanizer is provided with a concave surface for use in vulcanizing the tire casing or shoe, and a flat surface which is used for the inner tubes. The concave surface is clamped to the shoe while on the wheel, and the process finished without even detaching the tire. This is a great time and trouble saver and lessens the actual work connected with vulcanizing. The heating element consists of a metal ribbon imbedded in mica and hermetically sealed in the vulcanizer casing. This construction keeps the heater free from contact with the air, thus preventing oxidation.

The initial cost of automobile tires compels the owner to take every precaution to keep them in good condition for as long a period as possible. Unless properly attended to when first discovered, a hole in the shoe soon tears out. Often it is inconvenient to have the repairs made at that time, while with such a vulcanizer the job can be done quickly and as satisfactorily at home.

The process of vulcanizing requires from 15 to 45 minutes, depending on the cut and the part to be vulcanized. In the repairing of an inner tube, the patch is placed on the tire and then clamped to the flat surface of the vulcanizer. It is essential that the vulcanizer be brought to a temperature of about 275 degrees before applying and that this temperature be maintained through the process. The temperature is controlled by a rheostat and read by thermometer on the clamping board. For the shoe, the heat is applied as described above, and, except in case of very severe blow-outs, little trouble is experienced in the operation.

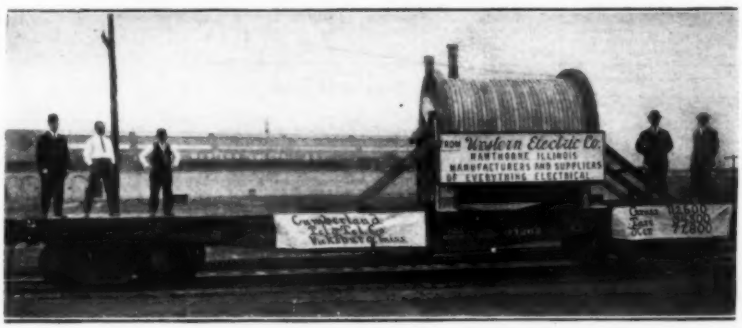
The importance of maintaining uniform heat is readily seen. The heat must be so evenly applied that every part will adhere to the tire. The heating element is so constructed that this is provided for, while the operator is able to note the temperature by means of the thermometer and rheostat.

The complete outfit is compact, so that it can be placed anywhere in the garage. It consists of the vulcanizer, 15-stop rheostat attached to a clamping board, attachment straps and thermometer and can be attached to any lighting circuit of 100 to 125 volts. In case the garage is not wired or current is not available for vulcanizing in the garage, the car may be taken to the side of the house and the vulcanizer attached to one of the chandeliers.

Large Submarine Telephone Cables.

The Western Electric Company announces that it recently broke two of its own records in submarine-cable manufacture, both of them within six months of each other. In February of this year, what was then the largest reel of armored submarine cable ever manufactured was shipped from the company's Hawthorne works. This was a 37-pair, No. 13 gauge, armored cable containing approximately 80 miles of copper conductor and forming a continuous cable 5,500 feet long. The weight of cable, reel and blocking to hold it on the flat car was 38 tons. The reel heads were 9 feet in diameter and 9 feet apart. The cable was laid in Galveston Bay, Tex., connecting the lines of the Western Union Telegraph Company from Virginia Point to Galveston Island.

A greater achievement followed six months later when the Western Electric Company shipped to the Cumberland Telephone & Telegraph Company the largest reel of duplex armored submarine cable ever turned out at the Hawthorne works. The cable contained 26 pairs of No. 13 gauge copper conductor made up into a cable 4,500 feet long. To manufacture the cable there were required over 1,000 pounds of paper, 15,000 pounds of lead, 47,000 pounds of wire and 7,500 pounds of miscellaneous material. The gross weight of the reel with its blocking was 56 tons or over 18 tons more than the first one described. This cable has been laid across the Mississippi River below Vicksburg, Miss., connecting the toll lines between that city and Shreveport, La.



Shipping a Large Submarine Telephone Cable.

New Plant for the Production of Aluminum.

The Southern Aluminum Company has awarded to the General Electric Company a $400,000 contract for the electrical equipment for the 40,000-horsepower hydroelectric plant at Whitney, which will supply electricity for the extensive aluminum works to be established at that place. The equipment purchased consists of seven 5,000-kilowatt and two 2,500-kilowatt, 250-volt, alternating-current generators with all necessary switchboard and control apparatus.

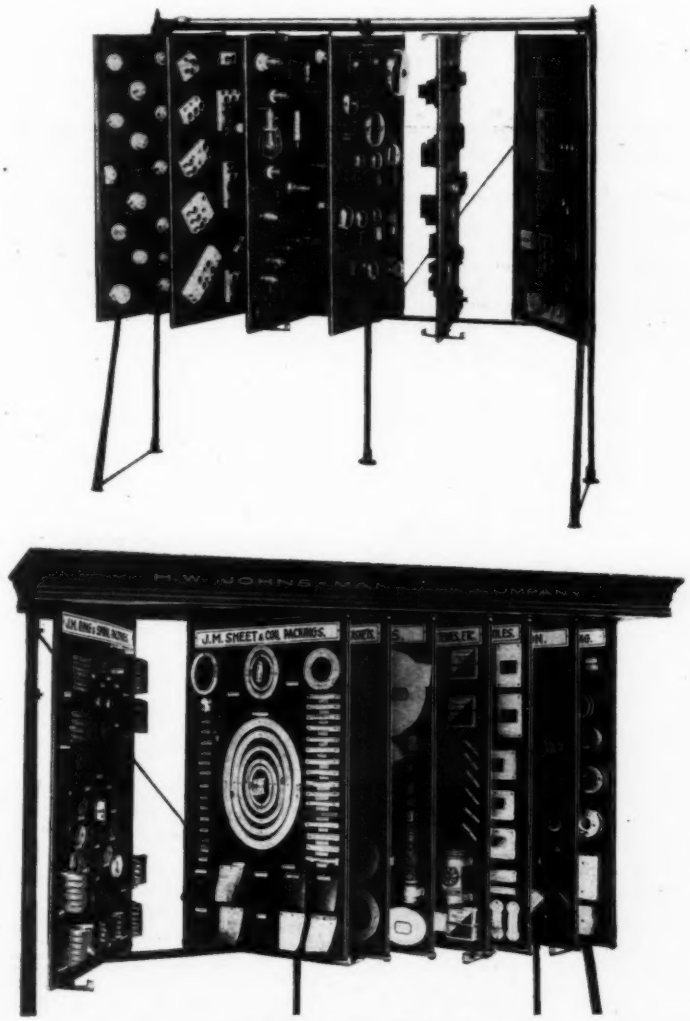
The dam of the power plant has been finished and work is now progressing on the power house, while work is also being started and pushed on the aluminum works proper and 500 concrete cottages of different designs for the employees of the company. The developments will cost about $10,000,000 and will be ready for operation probably by June of next year. Electrical furnaces will be used in the reduction of alumina to metal.

The Multiplex Display-Fixture System.

It has long been the experience of merchants who handle extensive lines of small goods at retail that unless these are displayed so as to be readily inspected by the prospective purchaser the number of sales is greatly diminished. Such display, however, has usually meant a large amount of counter and wall space which necessarily means a larger establishment and higher rental.

To meet this situation the Multiplex Display Fixture Company, 911 North Sixth Street, St. Louis, Mo., several years ago developed an assortment of compact, many-leaved fixtures that were found particularly useful for the display of small hardware. More recently these have been amplified and applied, among other purposes, for the display of electrical supplies. Many supply dealers have employed them with great success in relatively small quarters. Some of the most prominent electrical manufacturers and jobbers are co-operating with the Multiplex Company in placing these fixtures to the best advantage.

The two illustrations herewith show the principle of the Multiplex system, which now includes a very great variety of forms, sizes and special designs to meet almost every conceivable condition. The framework is of strong and durable construction. The leaves can be readily removed, if desired, to facilitate mounting the display. Bumpers are provided on each leaf to keep it from scratching or damaging the goods on the adjoining leaves. Most fixtures are arranged for placing along the wall, others are designed for placing in corners. Some are equipped with effective local lighting from the top of the framework.



Multiplex Display Fixtures.

Among the principal advantages of the Multiplex display fixtures are: great economy of floor space compared to equivalent counter display; accessibility of the goods to close inspection compared to the uninviting aspect of showcase display; economy of time and labor to the sales force in showing an entire typical line of actual samples and in eliminating putting them away again; impress the buyer with the extensive line of goods carried instead of keeping them put away out of sight; suggest many wants that the buyer did not anticipate; increase sales.

The Multiplex principle has even been adapted recently to an automatically moving window display. This is operated by an electric motor which turns the leaves one by one at definite intervals; after all have been turned to the left the motor reverses and turns each one to the right, this cycle being repeated automatically. Passersby are drawn to the display and watch it until every leaf has been seen on both sides. This makes a very effective way of displaying a large variety of goods in a window and at the same time tends to stimulate immediate and future trade.

Keelers Lamp Lock.

The Keelers Lamp Lock.

Where tungsten lamps are hung so as to be accessible in secluded but public places their value has occasionally served as a temptation to thievery. The loss incurred from this trouble by central-station companies, owners of large buildings, etc., has created a demand for lamp locks to prevent the unauthorized and malicious removal of the lamps.

An entirely new device of this kind that is said by its manufacturers to be absolutely proof against tampering, is the Keelers lamp lock, made by the

Penn Auto Specialty Company, Baum and Whitfield Streets, Pittsburgh, Pa.

As shown in the illustration herewith, this device is a plug socket that is simply screwed between the ordinary outlet socket or receptacle and the lamp. It requires no change of sockets and does not need a key or combination to make it effective. The lamp itself is locked in the screw shell as soon as it is screwed in. A pressure spring surrounding the shell permits the proper insertion of the lamp, but has a sharp prong protruding inwards and bent in such a way as to prevent unscrewing the lamp from the screw shell until the outer shell is removed, which cannot be done until the lamp is to be discarded. Nor can the Keelers' socket be removed because its plug thread is made of a stiff spring, which once screwed in is made to stay. The inner screw shell is locked when turned to the right, but it can be readily turned to the left without loosening the plug. The cap is entirely loose, so that when the outer shell is in place both these can easily be turned to the right or left without loosening the lamp or plug. Thus double protection is secured without changes in the fixture and without a special key or combination.

Latest Approved Fittings

The electrical fittings described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

CONDUIT, RIGID—Western Conduit Company, Manufacturer, 516 Stambaugh Building, Youngstown, O.

"Buckeye;" Standard.

Approved September 11, 1912.

CONDUIT, RIGID.—Mark Manufacturing Company, Manufacturer, Chicago, Ill.

"Navalite" and "Zinkote;" Standard.

Approved August 30, 1912.

FIXTURE WIRE.—Standard National Electrical Code, 1911 edition.

Fixture wires shown by tests and examinations conducted by the Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters, and examined at factories and passed by Underwriters' Laboratories, have standard labels attached to each coil. The following additional manufacturers are now supplying this wire:

John A. Roebling's Sons Company, Trenton, N. J.

Marking: One red thread and one blue thread woven in the braid.

The Electric Cable Company, Bridgeport, Conn.

Markings: Red and black threads parallel with wire between the rubber insulation and the braid; also one thread woven in the braid.

Bourn Rubber Company, Providence, R. I.

Marking: Three green threads parallel in braid.

Belden Manufacturing Company, Twenty-third Street and Western Avenue, Chicago, Ill.

Markings: Blue and yellow threads laid parallel with the wire between rubber insulation and braid.

FIXTURES.—Black & Boyd Manufacturing Company, Manufacturer, 432 East Twenty-third Street, New York, N. Y.

Approved June 29, 1912.

FIXTURES.—Huelsman & Moore, Manufacturers, 134 Opera Place, Cincinnati, O.

Border Light sections for theaters, constructed of sheet steel and provided with approved receptacles and wiring and suitable guard for borders.

Samples of this product have been examined and tested by Underwriters' Laboratories and found in accordance with standard requirements.

Approved August 24, 1912.

FIXTURES.—General Electric Company, Manufacturer, Schenectady, N. Y.

"G. E." Strip lights for theatre stages.

Sheet metal frames fitted with special molded composition, double-ended receptacles wired with slow-burning wire inclosed in approved metal molding.

"G. E." Exit Light Fixtures.

Cast-iron boxes designed for connection to conduit and inclosing an approved double-ended porcelain lamp receptacle. The cover of the box has opening in the shape of letters three, five or eight inches in height, spelling the word "Eixt," these openings being covered by a sheet of ruby glass attached to the back of the cover, but slightly separated therefrom to provide ventilation.

Approved August 30, 1912.

FIXTURES.—Grand Rapids Show Case Company, Manufacturer, Grand Rapids, Mich.

Show cases with built-in fixture for electric lights.

Approved August 20, 1912.

FIXTURES.—Garden City Plating & Manufacturing Company, Manufacturer, 1900 South Troy Street, Chicago, Ill.

Show-Case Reflectors. Metal bodies with glass reflectors and candelabra brass-shell sockets. Main supply wires of No. 14 B. & S. gauge with slow-burning insulation.

Types 281-M and 281-P.

Approved August 27, 1912.

FLEXIBLE CORD.—Belden Manufacturing Company, Manufacturer, Twenty-third Street and Western Avenue, Chicago, Ill.

Standard, National Electrical Code, 1911 Edition.

Marking: Blue and yellow threads laid parallel with wire between rubber insulation and braid.

HEATERS, ELECTRIC.—Manhattan Electrical Supply Company, Manufacturer, 17 Park Place, New York, N. Y.

Glue pots using above disc stoves, Catalog Nos. 602, 603.

Sealing-wax pots using above disc stoves, Catalog Nos. 600, 601.

Toaster, 110 volts, 500 watts, Catalog No. 575.

Approved August 24, 1912.

PANELBOARDS.—A. G. Electric & Manufacturing Company, Manufacturer, Postoffice Box 406, Seattle, Wash.

Two and three-wire panelboards, 125, 125-250 and 250 volts.

Approved August 9, 1912.

PICTURE MACHINES AND APPLIANCES.—Bendyke Manufacturing Company, Manufacturer, 305 N. Michigan Avenue, Chicago, Ill.

For The M. E. Petty Equipment Company, Chicago, Ill.

"McFeely Automatic Film Safety System."

These appliances are considered suitable for use when installed in a manner satisfactory to the inspection department having jurisdiction on a type of motion-picture machine expressly designated and approved for operation by a motor.

These appliances are not, however, considered suitable for use in adapting ordinary moving-picture machines for operation by a motor.

Approved September 7, 1912.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

EDGERTON, WIS.—Business men are raising funds to install a line of electroliers. C.

SUISUN, CAL.—A 50-year franchise has been sold the Great Western Power Company.

OSHKOSH, WIS.—The Chamber of Commerce is raising funds for a line of cluster lights. C.

WASHBURN, N. D.—This town is considering the installation of an electric light plant.

DIXON, CAL.—The Great Western Power Company has been granted a franchise in this city.

CHURDAN, IOWA.—Bonds for $10,000 have been voted for an electric light and power plant. C.

HUBBARD, IOWA.—The Park Dam Company has been granted a franchise for electric lighting. C.

HOPKINTON, IOWA.—W. A. Milroy has been granted a franchise for electric lighting at this place. C.

WORTHINGTON, IOWA.—There is an agitation here for the installation of an electric light plant. C.

FORT MADISON, IOWA.—The Mississippi River Power Company has been granted a franchise here. C.

LOS ANGELES, CAL.—A system of ornamental street lights is being planned for Huntington Beach.

BREMERTON, WASH.—Plans are being prepared for a municipal lighting plant and distributing system.

RIVERTON, IOWA.—The Council will call an election to vote on bonds of $5,000 for an electric light plant. C.

WALCOTT, IOWA.—The People's Light Company of Davenport will extend light and power wires to this place. C.

HALLETTSVILLE, TEX.—The City Council will install new machinery in the electric light and water works plant. D.

EDGEFIELD, S. C.—This place is planning to issue $5,000 in bonds for the purpose of enlarging the present electric light plant.

CEDAR FALLS, IOWA.—The City Council will have a report made on the cost and advisability of installing an electric light plant. C.

GARDEN GROVE, IOWA.—The town voted a local franchise to the Leon Electric Company, which will build a transmission line. C.

YUCAPA, CAL.—Work is to be started soon by the Edison Company on an electric power and light trunk line, which is to supply the Valley.

BOULDER, COLO.—The Boulder City Council has under consideration the erection of a municipal power and lighting plant which will cost $75,000.

WALCOTT, IOWA.—The Peoples' Light Company of Davenport has announced that it will build an extension of its line to Walcott at a cost of $27,000.

BOWLING GREEN, KY.—The City Council will buy a new boiler and make other improvements to the municipal electric light plant in the near future. G.

MARQUETTE, MICH.—A resolution has been passed by the Common Council to improve the lighting system in the down-town section of Marquette.

MOUNT BLANCHARD, O.—The Village Council will shortly decide whether or not $6,000 in bonds will be issued for the purpose of installing an electric lighting system.

WICHITA FALLS, TEX.—The North Texas Power Company will make extensive improvements to the water works plant, distributing system and the electric light plant here. D.

ELGIN, ILL.—The North Spring Street Improvement Association, headed by E. N. Herbster, has launched a scheme to install an ornamental system of lighting on Spring Street.

JACKSONVILLE, ORE.—The California-Oregon Power Company has approved plans and will begin work at once on a new electric light and power line through the Applegate Valley.

BALTIMORE, MD.—Lighting Superintendent McCuen is planning to install 1,000 additional street lamps next year, principally in alleys and in sections where streets are being improved.

EAST GRAND FORKS, MINN.—The bids received were rejected for the erection of a substation for the municipal light plant by the Water and Light Commission and new bids will be taken soon. C.

BOSTON, MASS.—The Virginian Power Company has been incorporated with a capitalization of $10,000,000. The company is to engage in the control and utilization of water power, dams and canals.

RAY, N. D.—The Village Board has decided to illuminate the entire residence portion with electricity, with the "White Wat" system on Main Street and the overhanging lamps on the other streets.

DELANO, MINN.—A 20-year franchise has been granted to the Central Minnesota Light & Power Company to erect, maintain and operate a system of electric light and power circuits in this village.

MIDDLETOWN, N. Y.—The Board of Managers of the Middletown State Hospital has decided to install a power house at the State institution. It is hoped to start work on this power house by the end of the year.

PLAINVIEW, TEX.—The Plainview Light & Ice Company has increased its capital stock from $30,000 to $60,000 for the purpose of making improvements and extensions to its electric light and power plant. D.

VALPARAISO, IND.—The Citizens Mutual Light, Heat & Power Company has been incorporated with a capital stock of $100,000. The directors are Charles E. Foster, John W. Sieb, James H. McGill and others.

BROOKLYN, N. Y.—The Edison Electric Illuminating Company has filed plans with the Building Department for a $10,000 power house, which will be partly used to generate power for the Manhattan Bridge Three-Cent Line.

ATLANTA, GA.—Plans are being prepared for a municipal street lighting system for Atlanta. City Electrician Turner is in favor of building a generating plant and believes that one of sufficient size could be installed for $200,000.

MILROY, IND.—Charles Wilters is installing an electric light plant in this town for the purpose of furnishing light during the Fall Festival to be held in October, after which time an effort will be made to enlarge and keep it permanently. S.

PAYSON, ILL.—The Payson Electric Light & Power Company has been incorporated with a capital stock of $5,000, to operate an electric light and power plant. The incorporators are William K. Elliot, L. K. Seymour, H. F. Scarborough and G. W. L. Baker.

CLARA CITY, MINN.—This village has under consideration issuing $5,000 in bonds for the purpose of installing electric lights. Clara City has an excellent water works system and it is altogether likely that it will take this additional step forward.

HARRISBURG, PA.—The Capital Light & Power Company has been incorporated with a capital stock of $5,000 for the purpose of furnishing light, heat and power in this place. The incorporators are Charles E. Covert, Thomas W. Smallwood and Henry M. Stine.

TYLER, TEX.—The Tyler Electric Street Car Company has adopted plans for the electric power plant that it will install here. The company is also at work building the first five miles of its electric railway system and it expects to have this part of the line finished by January 15, 1913. D.

HARRISBURG, PA.—The Pennsylvania Utilities Company has been incorporated with a capital stock of $40,000 by the merging of the Slate Belt Electric, Heat & Power Company, Jay, Adams, Webster, Calhoun, Quincy and Jackson Power Companies, which were chartered for Northampton and Monroe counties.

MOUNT CLEMENS, MICH.—A resolution to change the present street-lighting system of Mount Clemens to the cluster system all over the city

has been placed in the hands of the Public Lighting Committee with power to act and everything seems probable that the substitution will be made, probably this fall.

CORPUS CHRISTI, TEX.—Earl C. Heinly, Colorado Springs, Colo., who is part owner in the Corpus Christi Street & Interurban Railway Company, is at the head of a project to build another electric light plant in this city. It is expected to commence work by the first of November and have the plant completed within three months.

FORRESTON, ILL.—The Village Board has accepted a proposition from the Northern Illinois Utilities Company to install 23 lamp-cluster ornamental lights on the business streets and 36 tungstens in the residence section, all of 60-candlepower. The ornamental lights are to be the property of the city and the tungstens to be the property of the company. Z.

MARBLE ROCK, IOWA.—A petition is being circulated, prepared by Attorney Niles, in this place, to call for a vote on issuing bonds to erect a water-power plant and electric generating station. It has been estimated that it will require an expenditure of $17,000 to develop sufficient water power in the Shell Rock River to drive the generators for a municipal electric light plant large enough to properly light the town. Those who are boosting the enterprise hope to get it under way before cold weather arrives.

CANOVA, S. D.—A committee composed of V. E. Wheeler, W. A. Duxbury and Dean C. Trippler has been appointed to have in charge the matter of arranging for electric lights for this village. C. A. Laurson, of Howard, submitted a proposition whereby his company will run wires to Canova and furnish light and power provided the citizens of that place will purchase $3,000 worth of stock in the company. Ornamental street lighting is also under consideration by the committee, the cost of installing which is estimated at $3,000.

SALT LAKE CITY, UTAH.—Articles of incorporation of the Utah Power Company and the Utah Power & Light Company have been filed with the Secretary of State, both of which corporations were originally formed in Maine. The latter company has a capital stock of $1,000 and the Utah agent is W. J. Barrette, of this city. It is proposed by this company to engage in any and all transactions associated with the business of supplying electric energy for power, light, heat, telegraph, telephone, railway and manufacturing purposes, and to acquire by purchase or lease such properties as may be necessary in the accomplishment of this object. There are clauses in the incorporation articles which provide that the company may engage in the distribution of natural and artificial gas and steam and hot water. Purchase, lease or construction of power dams and reservoirs for hydroelectric plants enter into the proposed activities of the company. The Utah Power Company has a capital stock of $6,000,000, and G. A. Marr, of this city, is its Utah representative, and its scope is practically identical with that of the Utah Power & Light Company. It is specificially stated that both these companies are to operate in any or all states outside the state of Maine.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

WATTS, CAL.—The Pacific Telephone & Telegraph Company has been granted a franchise in this city.

BERKEY, O.—The Berkey Telephone Company has been incorporated by R. Murbach and others. The company is not organized for profit.

NATCHEZ, MISS.—The Cumberland Telephone & Telegraph Company has decided to install a telephone line between Natchez and Hattiesburg on the Michigan Central Road.

DALLAS, TEX.—The Dallas Automatic Telephone Company has announced that it will expend $500,000 in Dallas in the way of extension of service, both local and long-distance.

ALBUQUERQUE, N. M.—The Western Union Telegraph Company plans to install a dynamo plant together with extensive repeater equipment here to make this an overland repeating station.

PHELPS, N. Y.—Phelps Mutual Telephone Company has been incorporated with a capital stock of $9,000. The incorporators are H. F. Flint, James F. Kavanaugh and Frank R. Walker, all of Phelps.

FLASHER, N. D.—The Independent Telephone Company has bought out the South Morton County Telephone Company and will install a new local exchange here, and build a toll line from Mandan to Flasher. C.

LUCIEN, OKLA.—The Lucien Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are J. W. Oliver, O. S. Alloway, S. H. Gaines, A. W. Wolleson and J. L. Kirkhart, all of this place.

CARLINVILLE, ILL.—Macoupin County Telephone Company has been incorporated with a capital stock of $5,000 to operate a telephone and telegraph system. George B. Carey, Thomas A. Cheadle and C. B. Cheadle are the incorporators.

FREDERICK, MD.—The Chesapeake & Potomac Telephone Company will build 16 new trunk lines to Hagerstown, Baltimore and Washington. Plans are also being considered by the company for installing new switchboards in a number of places, as well as making other general betterments to its plant.

CERRO GORDO, ILL.—The Piatt County Mutual Telephone Company has been incorporated with a capital stock of $10,000 for the purpose of maintaining and operating a telephone system. Frank Etnoyer, Robert Blood, John C. Wine, Frank Wolfe and George Fulk are the incorporators.

LANCASTER, PA.—The Bell Telephone Company is scheduled to soon commence work on the reconstruction of its line between Lancaster and Christiana, which will cost in the neighborhood of $14,600. The line will be placed in thoroughly standard shape and the work includes stringing of over three miles of wire.

ROCK ISLAND, ILL.—The Tri-City Automatic Home Telephone Company is taking steps to secure a 25-year franchise to operate in this city, Moline and Davenport, construction work to start within three months and the line to be in operation within 18 months. Lines within the fire limits are to be placed underground. Z.

ELECTRIC RAILWAYS.

(Special Correspondence.)

MUSCATINE, IOWA.—The Muscatine Railway Company will make improvements to the system to cost $100,000. C.

TOLEDO, O.—It is announced that the Lake Shore Electric Railway Company will expend $100,000 on improvements to its line during the coming year. H.

STOCKTON, CAL.—Bids will be received up to October 14 for the sale of a street railroad franchise, applied for by the Stockton Electric Railroad Company.

MONTEREY, CAL.—The franchise applied for by the Monterey & Pacific Grove Railroad Company has been advertised for sale and the bids will be opened on October 15.

HEMPSTEAD, N. Y.—The Hempstead & Baldwin Traction Company is preparing to build a trolley line about five miles in length from Hempstead to Hempstead Bay and Long Beach.

LONGVIEW, TEX.—Great interest is being manifested at this place in the interurban railroad which is to be built to Caddo, a distance of 15 miles. It is said that Eastern capital has been interested in the project.

DAYTON, O.—The Dayton, Covington & Piqua Traction Company has decided to extend its line from Covington to Bradford, and in all probability on to Loramie. It is proposed to issue $400,000 in bonds to finance the work.

FORT DODGE, IOWA.—Officials of the Fort Dodge, Des Moines & Southern Interurban have announced that $90,000 will be spent on power equipment improvements to be installed in this city, Hope, Kelly, Boone and Ogden.

JACKSONVILLE, FLA.—The City Council of South Jacksonville has granted a franchise to N. W. Bates, G. G. Dowling, William R. Letcher, John S. Mabry and R. B. Harrison for the operation of an electric street railway through the streets of that municipality.

CHICAGO, ILL.—A plan of reorganization of the Chicago & Milwaukee Electric Railroad Company has been agreed upon by the bondholders, who, it is said, will make immediate improvements to the line and make it one of the finest interurbans of the country.

GAINESVILLE, TEX.—The Texas Utilities Company of Dallas has under consideration the project of constructing an interurban electric railway between Gainesville and Sherman, a distance of about 30 miles. The territory to be traversed is among the most populous in the state. D.

TUSCALOOSA, ALA.—The City Commissioners have under consideration a proposition from the Birmingham Gulf & Navigation Company for the electrification of its street car line. This proposition is accompanied by a request for a franchise for manufacturing light and power, etc.

NASHVILLE, TENN.—Richard T. Wilson, an electric railway man of this city, and William Burke, representing New York railway engineers, have practically completed plans for an interurban line which will extend from Nashville to Murfreesboro, and on to

Woodbury. The right-of-way is to be surveyed at once.

BELLEFONTAINE, O.—Plans are being prepared for an electric line between this city and Columbus *via* Sidney. While the road has been under consideration for several years necessary capital was not available until the present time. The line when built will pass through Zanesfield, West Mansfield, Peoria and Marysville. H.

TOLEDO, O.—The Toledo & Eastern Traction Company will issue common stock to the amount of $12,000, preferred stock $25,000 and bonds for $112,000. The line wil be built from Bono to Curtice, a distance of eight miles. H.

CENTRALIA, ILL.—The Centralia Traction Company has been incorporated to construct a line from Centralia to the new Illinois Central railroad yards in Washington County. The capital stock is $25,000 and the incorporators are John Langenfeld, Max Prill, Martin Beck, John Kihnlein and Charles C. Baldwin, all of Centralia.

WOODLAND, CAL.—Surveyors have been put to work between this city and Denverton by the Dozier Construction Company to complete the survey of the line of the Sacramento Valley Railroad Company. At Denverton the line will connect with the Oakland & Antioch Railroad. It is expected that the road will be in operation by January 1, 1915.

PADUCAH, KY.—The Kentucky Southwestern Electric Railway, Light & Power Company has arranged to commence the survey of a division from Mayfield to Murray. The citizens of Calloway county have subscribed a fund to bear their share of the expense of constructing a Calloway division in the net-work of Kentucky Southwestern lines which are planned.

PRINCETON, W. VA.—An interurban electric railway line 75 miles long, between Welch and Hinton, W. Va., and material improvements in the local railways of Princeton, Bluefield and Athens, are being planned by the Appalachian Power Company, which is to merge these properties as the result of negotiations begun by J. K. Henry, mayor of Princeton, as its representative. G.

JACKSONVILLE, FLA.—The Florida Interurban Railway & Tunnel Company, a $2,000,000 corporation which is now being organized in this city, it is said to be behind a project to build a tunnel under the St. John's River and build and operate an electric car line through the tunnels under the river to South Jacksonville, thence to St. Augustine, by way of Pablo. It is planned to start work within a few weeks.

SPRINGFIELD, ILL.—The Mississippi Valley Traction Company has been incorporated with a capital stock of $2,500 to construct an interurban line from Springfield to Quincy through the counties of Menard, Cass, Schuyler and Brown. The incorporators and first board of directors are George M. Skelley, W. S. Campbell and C. F. Smith of Springfield; Edward C. Creager, Kent, O.; and Johnson M. Creager, Youngstown, O. Z.

WICHITA FALLS, TEX.—It is the purpose of a syndicate of Tulsa, Okla., men to construct an interurban electric railway between Wichita Falls and Electra, and from Electra to Burkburnett. The proposed line will be about 30 miles long and will traverse the oil fields of Electra and Burkburnett. The plans of the syndicate for the construction of the road are said to be well advanced and construction will be started within the next few weeks. D.

FOREIGN TRADE OPPORTUNITIES.

(*Parties interested in the following item should address the Bureau of Manufactures, Washington, D. C., and refer to the file number noted.*)

NO. 9587. VACUUM CLEANERS. A European business man informs an American consular officer that he desires to import American vacuum cleaners and sweepers, and would like to hear from manufacturers of such equipment.

NEW INCORPORATIONS.

KANSAS CITY, MO.—Kieth Electric Company has been incorporated with a capital stock of $2,500 by H. L. Kieth, G. G. Steele and H. G. Woodruff.

TIOGA, N. D.—Tioga Electric Company has been incorporated with a capital stock of $10,000 by Olaf A. Nelson, N. W. Simon and Carl Severson, all of this place.

ALBANY, N. Y.—The Seely Electric Company has been incorporated with a capital stock of $15,000 by Mary E. Seely, Charles A. Seely and Hart I. Seely, all of Spencer, N. Y.

CHICAGO, ILL.—The Electric Service Construction Company has been incorporated with a capital stock of $2,500 by L. V. Murphy, Ambrose McLaughlin and George C. Schnackel.

BINGHAMPTON, N. Y.—Blanding Electrical Supply Company, Incorporated, has been incorporated with a capital stock of $10,000 by Harold T. Blanding, J. A. Blanding and E. L. Ackerman, all of Binghampton.

BUFFALO, N. Y.—Tower Electric Sales Company has been incorporated with a capital stock of $500. The incorporators are Henry L. Heitzman and Olga E. Klein, of Buffalo, and Herbert A. Zimmerman, of Kenmore, N. Y.

CHICAGO, ILL.—The Alyea Manufacturing Company has been incorporated with a capital stock of $10,000 for the purpose of manufacturing electrical devices. The incorporators are Charles R. Alyea, Graham Vanness and Preston Clark.

ROCHESTER, N. Y.—The Rochester Heating & Electrical Company has been incorporated with a capital stock of $10,000. The incorporators are Cyrus H. Hood and Robert H. Hood, Corning, N. Y., A. H. Woodcock and William G. Woodcock, Rochester, N. Y.

COLUMBUS, O.—The Hamilton Utilities Company has been incorporated with a capital stock of $850,000. The incorporators are J. C. Thomas, James M. Hutton, H. L. Brenneman and others. This is a reorganized company to take over the Hamilton Gas & Electric Company.

LOGANSPORT, IND.—The Relenber Electric Company has been incorporated with a capital stock of $50,000. The purpose of this corporation is to manufacture various kinds of electrical devices, machinery, etc. F. A. Rulenber, J. F. Sigan and J. E. Delong are the directors. S.

FINANCIAL NOTES.

The Puget Sound Traction, Light & Power Company will hold a special meeting on October 16 for the purpose of authorizing an increase of $1,136,400 in capital of preferred stock. Books will close October 6 and reopen October 17.

The Bankers Trust Company, as trustee, is inviting proposals in writing, for the sale of Southwestern Utilities Corporation five-year six-per-cent gold notes, to exhaust the sum of $365,000 in cash now on deposit with the trustees. Proposals will be received at any time prior to close of business October 7.

The city attorney of Dallas, Texas, has ruled that the application made to the City Commission by the Dallas Automatic Telephone Company for permission to increase its capital stock to $200,000 and to issue $250,000 of additional bonds, must be advertised for thirty consecutive days before it can be acted upon. This will delay the company in its proposed expansion, but it is believed that the final action of the City Commission will be favorable.

The $5,000,000 issue of new bonds of the Pacific Gas & Electric Company, which was recently authorized by the California Railroad Commission, and sold to J. P. Morgan & Company, has been resold to two other New York banking houses, and will soon be offered to the public. These bonds are to provide for the company's improvements in northern California, but the amount will not cover all of the improvements contemplated. Plans have already been matured for expenditures amounting to $12,282,441, to meet which it is probable an additional issue of $7,000,000 may be asked next year.

J. P. Morgan & Company, of New York, and Lee, Higginson & Company, of Boston, are offering, in connection with Morgan, Grenfell & Company, of London, $10,000,000 five-per-cent gold debenture bonds of the General Electric Company at 99.75 and interest. The bonds are dated September 2 and are to run for forty years, and interest is payable March 1 and September 1 in New York, Boston and London. The issue is callable in whole or in part at 107.5 and interest on any interest date upon six weeks' notice. In connection with this issue President C. A. Coffin, of the General Electric Company, states that it has no mortgage debt, and that with the exception of purchase money mortgages and of pledges as security for temporary loans or as indemnity, no mortgage can be made without equally securing these debentures. The total funded debt of the company, including this issue, is $12,452,500, while the net quick assets in excess of the liabilities on December 31, 1911, were $57,179,760, to which will be added the proceeds of this issue, making a total of more than five times the funded debt.

Dividends.

Associated Gas & Electric Company, a regular quarterly dividend of 1.5 per cent on the preferred stock, payable October 15 to stock of record September 30.

Bell Telephone Company of Pennsylvania; the regular quarterly dividend of 1.5 per cent, payable October 15, to stock of record October 4.

Central & South American Telegraph Company; the regular quarterly

dividend of 1.5 per cent, payable October 8 to stock of record September 30.

Cincinnati, Newport & Covington Light & Traction Company; a quarterly dividend of 1.375 per cent, payable October 16 to stock of record October 1.

Cleveland Telephone Company; a quarterly dividend of 1.25 per cent, payable September 30 to stock of record September 25.

Illinois Traction Company; a quarterly preferred dividend of 1.5 per cent, payable October 1 to stock of record September 15.

Mexican Telegraph Company; a regular quarterly dividend of 2.5 per cent payable October 15 to stock of record September 30.

Michigan State Telephone Company; quarterly common and preferred dividends of 1.5 per cent, respectively, payable September 30 to stock of record September 25.

National Carbon Company; a quarterly dividend of 1.5 per cent, payable October 15 to stock of record October 5.

Rio de Janeiro Tramway, Light & Power Company; a quarterly dividend of 1.25 per cent, payable November 1 to stock of record October 10.

Sao Paulo Tramway, Light & Power Company; a quarterly dividend of 2.5 per cent, payable November 1 to stock of record October 10.

Scioto Valley Traction Company; a quarterly perferred dividend of 1.25 per cent, payable October 1.

Southern California Edison Company; a quarterly preferred dividend of 1.25 per cent, payable October 15 to stock of record September 30.

Southern New England Telephone Company; a quarterly dividend of 1.75 per cent, payable October 15 to stock of record September 30.

Trinidad Electric Company, a quarterly dividend of 1.25 per cent, payable October 10 to stock of record September 30.

Virginia Railway & Power Company; a semi-annual dividend of one per cent on the common stock, same as initial dividend, payable October 21, to stock of record October 7.

Western Electric Company; the regular quarterly dividend of two per cent, payable October 1, to stock of record September 24.

Reports of Earnings.

AURORA, ELGIN AND CHICAGO.

The Aurora, Elgin & Chicago Railway Company reports for the year ended June 30, 1912, compared as follows:

	1912.	1911.
Gross	$1,892,388	$1,774,992
Expenses	1,137,172	1,053,347
Net	755,216	721,644
Other income	8,241	15,492
Total income	763,457	737,136
Charges	386,127	423,373
Surplus	377,330	313,763
Dividends	279,000	279,000
Net surplus	98,330	34,763
Previous surplus	354,729	316,670
Adjusted debit	5,132	*3,291
P. & L. Surplus	458,186	354,724

*Credit.

NEW YORK STREET RAILWAY STATISTICS.

The following summary of street railway operations in the city of New York for the months of May and June, 1912, has been prepared by the New York Public Service Commission:

June	1912	Increase
Rev. car mileage	$ 27,057,290	$ 562,804
Transfers collected	29,755,406	596,874
Passengers	147,444,545	8,280,224
Transportation rev.	7,412,651	450,966
Total st. ry. op. rev.	7,762,498	422,656
Total expenses	4,141,847	*79,573
Taxes	516,154	96,148
Oper. income	3,104,497	406,080
Other income	1,435,487	1,236,326
May—		
Rev. car mileage	27,709,756	425,483
Transfers collected	28,220,735	1,735,774
Rev. passengers	149,753,037	3,478,597
Transportation rev.	7,526,286	215,117
Total street ry. rev.	7,867,596	249,097
Total expenses	4,062,291	*134,185
Taxes	505,166	19,187
Operating income	3,300,139	364,094
Other income	227,802	40,214

*Decrease.

SOUTHERN BELL TELEPHONE COMPANY.

The Southern Bell Telephone & Telegraph Co. reports to the New York Stock Exchange for the year ended June 30, 1912, as follows:

Telephone revenue	$6,919,867
Interest revenue	332,895
Dividends received	318,640
Total receipts	7,571,402
Operating expenses	2,554,393
Maintenance and depreciation	2,150,884
Taxes	381,930
Total deductions	5,087,207
Net earnings	2,484,195
Interest	632,521
Surplus	1,851,674
Dividends	1,284,000
Surplus	567,674

PHILADELPHIA RAPID TRANSIT.

The Philadelphia Rapid Transit Company reports for August as follows:

	1912.	1911.
August gross	$1,913,094	$1,794,989
August net	767,129	668,772
Surplus after charges	10,028	*67,910
Two months gross	3,832,034	3,651,805
Two months net	1,529,843	1,380,821
Surplus after charges	14,560	*93,151

*Deficit.

AMERICAN RAILWAYS COMPANY.

The American Railways Company has issued its pamphlet report for the year ended June 30, 1912. The income account compares as follows:

	1912.	1911.
Income from subsid. cos.	$851,893	805,963
Miscellaneous income	12,482	4,451
Total income	864,376	810,414
General expense	6,827	3,891
Interest fund debt	377,750	370,400
Taxes and miscellaneous	16,498	13,635
Total deduction	401,075	387,926
Net income	*463,300	422,487
Dividends paid	392,289	381,787
Surplus	71,011	40,700
Previous surplus	554,187	515,924
Total surplus	625,199	556,624
Adjust debit		2,437
Profit and loss surplus	625,199	554,187

*Equal to 6.9 per cent on $6,713,150 capital stock.

INTERBOROUGH-METROPOLITAN COMPANY.

The annual financial statement of the Interborough-Metropolitan Company, for the year ended June 30, 1912, compares as follows:

Receipts:	1912.	1911.
Divs. on I. R. T. stock	$5,426,048	$3,052,152
Interest, etc.	327,782	324,293
Total income	5,753,830	3,376,445
Disbursements:		
Int. on Int-Met bonds	$3,052,125	$3,052,125
Int. on 6 per cent notes	432,516	392,964
Int. on bills payable	19,014	7,937
Expense account	94,995	83,527
Taxes	29,873	32,692
Total disbursements	3,628,524	3,569,246
Surplus	2,125,307	*192,801
Previous surplus	681,500	874,301
Total surplus	2,806,807	681,500

*Deficit.

LONDON UNDERGROUND.

The associated companies of the Underground Electric Railways Co., of London, report for the month of August, compared as follows:

METROPOLITAN DISTRICT RAILWAY.	1912.	1911.	1910.
Gross receipts	£60,639	£54,205	£51,475
Working expenses	33,112	30,171	28,282
Net receipts	27,527	24,034	23,193
LONDON ELECTRIC RAILWAY.			
Gross receipts	£55,886	£51,456	£51,190
Working expenses	32,093	31,710	30,498
Net receipts	23,793	19,746	20,692
LONDON UNITED TRAMWAYS, LTD.			
Gross receipts	£30,894	£34,494	£23,996
Working expenses	18,909	18,819	20,942
Net receipts	11,985	15,675	13,054

TWIN CITY LINES.

The Twin City Rapid Transit Company reports as follows for August and eight months ended August 31.

	1912.	1911.
August gross	$ 716,978	$ 671,324
August net	362,593	354,281
Charges, taxes, preferred dividends, etc.	143,079	140,079
August surplus	219,515	214,202
Eight months' gross	5,358,228	5,163,343
Eight months' net	2,600,005	2,579,952
Charges, taxes, preferred dividends, etc.	1,141,633	1,120,633
Eight months' surplus	1,458,372	1,459,318

INTERBOROUGH RAPID TRANSIT.

The earnings of the Interborough Rapid Transit Company for the month of August and two months ended August 31, 1912, compare as follows:

	1912.	1911.
August gross	$2,333,152	$2,146,162
Net after taxes	1,110,087	952,434
Other income	29,404	25,936
Total income	1,139,491	978,370
Surplus after charges	220,455	81,401
Passenger car	45,326,918	41,550,418
Two months' gross	4,600,561	4,233,891
Net after taxes	2,153,394	1,863,821
Other income	56,409	51,753
Total income	2,209,803	1,915,574
Surplus after charges	371,731	121,636
Passengers carried	89,383,909	81,595,686

KEYSTONE TELEPHONE.

The Keystone Telephone Company reports as follows for August and eight months ended August 31.

	1912.	1911.
August gross	$101,128	$ 96,928
August net	48,524	47,681
Surplus after charges	23,049	22,608
Eight months' gross	799,779	774,342
Eight months' net	396,409	389,112
Surplus after charges	195,369	193,333

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Sept. 30.	Sept. 23.
American Tel. & Tel. (New York)	145¾	144½
Commonwealth Edison (Chicago)	138½	138½
Edison Electric Illuminating (Boston)	272½	290
Electric Company of America (Philadelphia)	*12¾	*12¼
Electric Storage Battery common (Philadelphia)	56⅜	56¾
Electric Storage Battery preferred (Philadelphia)	56⅜	56¾
General Electric (New York)	183¼	182¾
Kings County Electric (New York)	129	129
Manhattan Transit (New York)	1½	2
Massachusetts Electric common (Boston)	20	18¾
Massachusetts Electric preferred (Boston)	79	76½
National Carbon common (Chicago)	128	127
National Carbon preferred (Chicago)	118	117½
New England Telephone (Boston)	153½	153½
Philadelphia Electric (Philadelphia)	23⅝	24¼
Postal Telegraph and Cables common (New York)	87½	87½
Postal Telegraph and Cables preferred (New York)	68⅜	68½
Western Union (New York)	81⅛	81
Westinghouse common (New York)	85¼	85⅞
Westinghouse preferred (New York)	*125	*125

*Last price quoted.

NEW PUBLICATIONS.

PHILADELPHIA ELECTRICAL BUREAU.—The annual report of the Chief of the Electrical Bureau and of the Director of the Department of Public Safety, of Philadelphia, for the year ending December 31, 1911, has been issued. This is very complete, and includes an appendix giving the duties of the Chief of the Bureau, the Bureau's finances, cost of instruments and property of the city in use, etc.

LIGHTNING IN RELATION TO FOREST FIRES.—The United States Forest Service has issued Bulletin No. 111 with the foregoing title. This is a 39-page publication, written by Fred G. Plummer, geographer, and gives the results of an extended study of this subject. It is found that lightning is one of the chief causes of forest fires, observations showing that it ranges second only to locomotive sparks as a source of conflagration. No particular species of trees is more likely to be struck by lightning than any other, this depending upon its height and relation to surrounding trees, its isolation, whether it is deeply rooted, etc.

MINERAL WASTES.—The Bureau of Mines, Washington, D. C., has issued Bulletin No. 47, which is a 44-page discussion by Charles L. Parsons on the occurrence and possible methods for preventing mineral wastes. The bulletin points out very strikingly that about one-half of the entire coal production of the country is either wasted or is left underground in such condition that it probably never will be recovered. In the metal industries the wastes, as a rule, are not so serious because in many cases metals are recovered as junk. In the case of zinc, however, very great losses occur both in the concentration of the ores and in the utilization of the metal. The bulletin discusses almost every branch of the commercial mineral industries with regard to possible elimination of wastes, and throughout takes the standpoint that the conservation of our natural resources will necessitate more and more attention being given to the subject.

PERSONAL MENTION.

HENDERSON W. KNOTT, American manager of the Morgan Crucible Company, Ltd., is spending the present month in England.

S. B. HOWARTH, vice-president of the St. Paul Electric Company, St. Paul, Minn., has just returned from a five weeks' trip through the New England States.

CLYDE WAGSTAFF, local agent of the Ohio Electric Company, Van Wert, O., and Miss Lulu Bechdolt, of Wapakoneta, were recently married at Dayton, O. The young couple will make their future home in Van Wert.

G. E. PALMER, for two years district equipment supervisor, Los Angeles, Cal., has been promoted to the newly created position of division traffic supervisor of the Pacific Division, Western Union Telegraph Company, stationed at San Francisco.

A. O. KUEHNSTEDT, of the Gregory Electric Company, entertained the members of the Chicago Moral Risk Club at a luncheon at the Hinsdale Country Club, Hinsdale, Ill., on September 26. This proved to be a fine outing for the members. The Chicago Moral Risk Club is composed of the credit men of the leading electrical manufacturers and jobbers.

J. McA. DUNCAN has been appointed district manager of the Westinghouse Electric & Manufacturing Company, for the Pittsburgh District, succeeding W. F. Fowler, who has accepted a position with the W. S. Kuhn Corporation. The Pittsburgh sales office has charge of all the sales for the Pittsburgh district and is one of the most important of the offices maintained by this company. Mr. Duncan has been in the employ of the Westinghouse Electric & Manufacturing Company for about 25 years, and is one of the original group of eight men taken from the Union Switch & Signal Company, of Pittsburgh, to form the Electric Company, which was established at the same place. His first position was in the Shipping Department. He was next placed in the Correspondence Department, in which position he afterwards had charge of all railway and lighting apparatus made by this rapidly growing company. In 1906 he was placed in charge of the Price Department, passing upon prices of all apparatus manufactured. For a year or two he was located in the New York office on some special work in connection with the costs. Mr. Duncan

J. McA. Duncan.

then returned to East Pittsburgh and was appointed director of costs in the office of the manager of works, and later became assistant manager of works, in charge of production and costs. Last spring, when the present revival of industry began, the increased activity resulting from the additional business secured, necessitated a division of work, and Mr. Duncan was appointed director of works accounting.

THEODORE BLECH, formerly power agent of the Public Service Company of Northern Illinois, has been appointed superintendent of the Waukegan District for the same company. In this position Mr. Blech will have general supervision of the territory which extends north to the state line, south to and including the town of Glencoe, and west to Fox Lake. Mr. Blech received his education in Germany, graduating in 1903 and receiving the degree of electrical engineer in 1904. He came to this country in 1904, working first for the Western Electric Company and later as assistant electrical engineer for the firm of Ford, Bacon & Davis. In this position Mr. Blech investigated the street railway system of Memphis, Tenn., and made an extensive report on conditions found there. Later Mr. Blech became connected with the Falkenau Electrical Construction Company, and in this position assisted in the design of Power Station No. 2 for the Gary & Interurban Railway Company at Gary, Ind. In May, 1911, he entered the service of the Public Service Company, which was then the North Shore Company, in the capacity of power agent, and the large volume of business which he signed while in this position was responsible for his appointment to the superintendency of the Waukegan District.

OBITUARY.

WILLIAM McCAFFREY, sales manager for the Canadian General Electric Company, Toronto, Ont., his mother, wife and two children, were drowned September 29 while on a fishing expedition at Omemee. A 14-pound muskallonge which had been hooked by Mr. McCaffrey was responsible for the deaths of the family party. A searching party was formed after the canoe in which the party had started out was found floating upside down, and the bodies were recovered by dragging the lake. Clutched in the hands of Mr. McCaffrey when his body was found was a trolling line, and on the hook was a 14-pound muskallonge.

DATES AHEAD.

The 1912 Boston Electric Show, Mechanics' Building, Boston, Mass., September 28 to October 26.

American Electric Railway Association and its five affiliated associations. Annual convention, Chicago, Ill., October 7-11.

Electric Vehicle Association. Annual convention, Boston, Mass, October 8 and 9.

Railway Signal Association. Annual meeting, Quebec, Can., October 8-11.

The New York Electrical Exposition and Automobile Show. The New Grand Central Palace, New York City, October 9-19.

Sons of Jove. Annual convention, Pittsburgh, Pa., October 14-16.

New England Section of the National Electric Light Association. Fall meeting, Boston, Mass., October 15-17.

Kansas Gas, Water, Electric Light and Street Railway Association. Annual meeting, Manhattan, Kans., October 17-19.

Association of Railway Electrical Engineers. Annual convention, Chicago, Ill., October 21-24.

Illinois State Electrical Association. Annual convention, Peoria, Ill., October 22-24.

Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps. Annual convention, Jacksonville, Fla., October 22-24.

Indiana Electric Light Association. Annual convention, Indianapolis, Ind., October 30 and 31.

Electrical Supply Jobbers' Association, Hot Springs, Va., November 13-15.

Association of Telephone Pioneers of America. Annual convention, New York City, November 14-15.

Ohio Society of Mechanical, Electrical and Steam Engineers. Annual meeting, Akron, O., November 21-22.

American Mining Congress. Fifteenth annual meeting, Spokane, Wash., November 25-28.

American Association for Advance-

ment of Science and affiliated societies. Annual meeting, Cleveland, O., December 30-January 4, 1913.

American Society of Mechanical Engineers. Annual meeting, New York, N. Y., December 3.

Western Association of Electrical Inspectors. Annual meeting, St. Louis, Mo., January 28-30, 1913.

With the Electrical Manufacturers

The F. W. Wakefield Brass Company, Vermillion, O., has just issued catalog No. 12, giving a large number of new designs of electric lighting fixtures. This 64-page catalog is thoroughly illustrated with all kinds of electric fixtures and with numerous fixture parts.

The Chicago Rawhide Manufacturing Company, Chicago, maker of rawhide pinions and other leather specialties, finds that the demand for its product is so great that it is obliged to build a new factory which will more than triple its product. The new factory will be completed in about four months.

The Cutter Company, Philadelphia, Pa., has issued its new 10 by 18.5 inch wall calendar for the year October, 1912-September, 1913. On each monthly sheet is given a large illustration of various new forms of its well known I-T-E circuit-breakers, which are meeting a larger variety of conditions than ever.

Machen & Mayer Manufacturing Company, Philadelphia, Pa., removed on September 1 to its new factory building at Twenty-First Street and Fairmount Avenue. The new building affords twice as much space as the former quarters and the plant is laid out on a scientific basis. The company is prepared to fill all orders promptly and accurately.

Grayson Railway Supply Company, 405 La Salle Building, St. Louis, Mo., has begun business by securing the manufacturers' agency for supplies appertaining to the operation and maintenance of roadbed and rolling stock of street railways. F. O. Grayson, formerly general sales agent of the St. Louis Car Wheel Company, is president and general manager.

Kerr Turbine Company, Wellsville, N. Y., has found it necessary to open a branch office in Pittsburgh, to take care of increased business in that district. The new office will be located in 2137 Oliver Building, and will be in charge of R. M. Rush, formerly with the Dravo-Doyle Company. With Mr. Rush will be associated F. B. Allen, formerly of the Cleveland office of the Cooper Hewitt Electric Company.

Lockwood, Greene & Company, architects and engineers for industrial plants, have removed their Boston offices to 60 Federal Street, occupying three floors of the First National Bank Building. The new offices will provide better facilities for handling the business, which includes the design of industrial plants, investigation and design of water-power developments, steam, water and electric power-plant tests and the valuation and reorganization of existing plants, as well as acting in the capacity of permanent consulting engineers for many industrial concerns.

The American Conduit Manufacturing Company, Pittsburgh, Pa., has published recently what is probably the most unique and enduring form of insert for a standard data book that has been distributed to the electrical industry. This takes the shape of a heavy celluloid card six by nine inches, perforated in three places for binding, and having complete information with regard to rigid conduit prices, net prices per 100 feet at various discounts, price of elbows of different dimensions and radii, and net price per hundred for couplings. This information in this particular form is highly valuable, and contractors, supply men and engineers all over the country are making constant inquiries for copies.

Triumph Electric Company, Cincinnati, O., has issued bulletin No. 501, which describes the Triumph-Monitor reversing-motor planer drive. This includes a very ingenuous automatic monitor controller which operates through a set of automatic relays and switches. The drive is through a special direct-connected motor, which, it is claimed, increases the output of a planer some 50 per cent. The speed of both the cutting and return strokes may be quickly varied by small steps without stopping the planer. The motors used are capable of wide speed adjustment. The bulletin describes in detail the various features of the entire system and gives a number of characteristic curves and connection diagrams which will be found of great interest.

International Railophones, Limited, Birmingham, England, has issued a booklet, describing the new "KK" detector. This device was developed by H. Von Kramer and Dr. Gisbert Kapp, in connection with the research work that resulted in the invention of the Railophone system. It is a highly sensitive alternating-current relay, which is capable of responding to currents as low as 0.0002 ampere flowing under an electromotive force of about 0.02 volt at a frequency of 100 cycles per second. Although the instrument was devised particularly for use in the receiving circuit of the Railophone, it has been found very serviceable in a great variety of other circuits for detecting minute alternating currents for which the ordinary telegraphic relays are not sufficiently sensitive.

Wm. Gaertner & Company, 5347 Lake Avenue, Chicago, has issued Catalog E, which deals with a great variety of scientific electrical apparatus and supplies dealt with by this company. Included in this is a complete set of apparatus for the Willikan and Mills short university course in electricity, including magnetic apparatus, galvanometers, telescopes and scales, electrolytic apparatus, direct-reading measuring instruments, rheostats, keys, resistance and bridge sets, condensers, induction coils, transformers, static machines, dry and wet primary cells, storage batteries, electrolytic and mercury-arc rectifiers, motors, switches, lamps, etc. The company has also issued Circular No. 331 which deals with the Scientia calorimetric outfit. The component parts of this apparatus are described and illustrated.

The Safety Insulated Wire & Cable Company, New York, N. Y., has issued through its Western Department, M. B. Austin & Company, Chicago, an interesting pamphlet describing its Safety steel-taped cables for underground service without conduit. These have been used very extensively for ornamental street-lighting circuits in a large number of American cities, for which they have been found particularly serviceable in permitting rapid and low-cost underground installation. They have also been used for park lighting, over 1,000,000 feet having been installed in New York City alone for this purpose. For railroad crossings and signal work this cable has been found very adaptable where it has been necessary to lay the conductors between or alongside the railway tracks. The cable is made with single, double and triple conductors and is thoroughly insulated and protected from moisture or possible mechanical injury. The pamphlet may be obtained upon request.

Westinghouse Electric & Manufacturing Company. East Pittsburgh, Pa., reports that among recent orders received by it are the following: Oakland, Antioch & Eastern Railroad Company, San Francisco, Cal., for two 750 kilowatt, 1300-volt, direct-current and 11,000-volt, three-phase, 60-cycle, two-bearing synchronous motor-generator sets, together with two five-panel switchboards for the control of same; Rochester Railway & Light Company, Rochester, N. Y., one three-unit, four-bearing motor-generator set consisting of one 145-kilowatt, 120-volt direct-current generator, also one 45-kilowatt, 80-volt direct-current generator driven by one 285 horsepower, 4150-volt, three-phase, 60-cycle, synchronous motor; Cincinnati Traction Company, Cincinnati, O., 50 double equipments of No. 318 motors and type K-40-A single-end control; Peninsular Railway Company, San Jose, Cal., eight quadruple equipments of No. 333-B-2 motors designed for operation on 600-1200-volt circuits with type A-L-F control; Pacific Electric Company, Los Angeles, Cal., 45 quadruple equipments of No. 333B-2 motors for 600-1200-volt circuits with type A-L-F control. This company has issued a number of new sections for its catalog No. 3002. Among these are included new index and discount sheets, inserts relative to type SK mo-

tors, reversing-motor planer equipment, reversing-motor dimensions, ratings and dimensions of types DA and CA motors, and types E and E-1 auto-starters.

Allis-Chalmers Company, Milwaukee, Wis., reports that recent sales of its Corliss engines include some very large units. Among these are a twin tandem-compound reversing engine, 40 and 66 by 62 inches, for the Minnesota Steel Company, Duluth, Minn.; a tandem-compound rolling-mill engine, 50 and 78 by 60 inches, for the Carnegie Steel Company, Bessemer, Pa.; an 18 and 30 by 36 inch cross-compound direct-connected unit for the Northwestern Iron Company, Maysville, Wis.; two 20 by 42 inch direct-connected engines for the Illinois Vinegar Manufacturing Company, Chicago; belted engines for the American Trading Company, New York, the City of Lamar, Mo., and Henry Seers, Incorporated, New York, and a 30 and 46 by 42 inch cross-compound direct-connected engine for the Boston Store, Chicago. The last named includes a 750-kilowatt direct-current generator, also of Allis-Chalmers Company's build, and is especially interesting from the fact that the terminal pressure is only 120 volts, this low voltage being unusual for a machine of that size. The generator has a single commutator and is supplied with interpoles. This type of unit makes an excellent one for large office and mercantile buildings and is likely to grow in favor.

Record of Electrical Patents.

Issued by the United States Patent Office, September 24, 1912.

1,039,104. Wire-Splicing Tool. H. L. Crowmer, Indianapolis, Ind. A tubular handle has a transverse recess at one end; one end of the wire is placed in the hollow stem and then twisted around.

1,039,106. Adjustable Support for Chandeliers. R. Daugherty, Harrisburg, Pa. A telescoping stem includes brushes and sliding contacts.

1,039,107. Governing Device. W. W. Dean, assignor to Dean Electric Co., Elyria, O. A centrifugal switch is closed when the speed reaches a certain value.

1,039,110. Electric Motor. H. I. Finch, assignor to Emerson Electric Manufacturing Co., St. Louis, Mo. An inclosed motor with special fan blades and grooves to ventilate the motor.

1,039,120. Electric Sadiron. L. E. Grubbs, Logansport, Ind. Has a coreless heating coil arranged as a double V with the rear outer ends connected.

1,039,129. Disconnecting Electrical Switch. D. C. Hooker, assignor to Johns-Pratt Co., Hartford, Conn. The knife blade is detachable from its pivot when open; the handle is also detachable in one position.

1,039,135. Process of Electric Welding. A. L. Johnson, Hamburg, N. Y. A metal insert is interposed between the plates to be welded and then the electrodes are pressed to the outer sides.

1,039,137 and 1,039,138. Process of Electric Welding. A. L. Johnson, Hamburg, N. Y. The first patent is a modification of the one above. According to the second patent, the plug insert is placed through a hole in one of the plates.

1,039,139. Sectional Service Board. N. Joleen, Chicago, Ill. A locked cabinet has a base section containing the main switch and cutouts, and superposed sections for various branch-circuit groups.

1,039,142. Electric Burglar-Alarm. W. Keenleyside, Bisbee, Ariz. A window circuit-closer with a pair of spring contacts.

1,039,147. Car, Hose and Electric-Wire Coupling. L. Le Compte and J. Le Compte, assignors to Le Compte Co., Chicago, Ill. A car coupler with special electric coupling beneath.

1,039,156. Plug Switch. J. J. Lyng, assignor to Western Electric Co., New York, N. Y. A shell holds a pair of plugs separated by a spring.

1,039,162. Electric Arc Lamp. L. M. McBride, assignor to McBride-Frazier Arc Lamp Co., Denver, Colo. Relates to the feed for a converging type flaming arc.

1,039,170. Electric Controller Device. J. F. Miller and W. V. Turner, Edgewood, Pa. Two pawls controlled by air pressure serve to lock the controller handle.

1,039,171. Electric Ignition System for Internal-Combustion Engines. J. L. Milton, Louisville, Ky. A jump-spark system in which the other plugs are temporarily short-circuited while one is sparked.

1,039,174. Thermostat. E. Moss, Christchurch, New Zealand. Includes three electric circuits.

1,039,175. Illuminated Sign. H. Mulholland and C. G. West, assignors to G. M. Potter, New York, N. Y. The front wall of each sideways-slidable letter is studded with glass bulbs forming the letter, behind which is an incandescent lamp.

1,039,104.—Wire Splicer.

1,039,181. Aerostructural Balance. R. M. Palmer, Washington, D. C. The ailerons are automatically and electromagnetically actuated to various degrees of inclination.

1,039,187. Sign. L. Powell, U. S. Army. An incandescent lamp is in the center of a casing with diverging conical walls.

1,039,197. Variable-Speed Electric Generator. C. H. Roth and W. J. Warder, Jr., Chicago, Ill. Includes a centrifugal governor that controls a circuit-breaker.

1,039,198. Shade-Holder. W. G. Schmucker, Ben Avon, Pa. The inner part consists of two hinged jaws that can be closed and locked over the socket and that hold the shade from beneath.

1,039,247. Electric Signal. C. C. Blake, assignor to Blake Signal & Manufacturing Co., Boston, Mass. A train-dispatching selective system with a pendulum at each way station responsive to a particular frequency.

1,039,248. Junction Box. W. L. Bliss, assignor to United States Light & Heating Co., New York, N. Y. Has a central raised portion through which and the base a conductor may be led. also lateral conduit openings.

1,039,257. Fused Disconnecting Switch. R. C. Cole, assignor to Johns-Pratt Co., Hartford, Conn. Inside the hollow contact blade is a fuse.

1,039,264. Pneumatic Blow-Out for Electric Switches. E. H. Dewson, assignor to Westinghouse Air Brake Co., Pittsburgh, Pa. A passage from the air chamber through the piston rod directs the air upon the contact points.

1,039,266. Diaphragm for Electrolysis. O. Diffenbach, Darmstadt, Germany. Consists of a mixture of cement and asbestos fibers.

1,039,272. System for Controlling Electric Motors and the Like from a Distance. H. Gradenwitz, W. Vollbrecht, and H. Levzow, assignors to Elektromotoren-Werke Hermann Gradenwitz, Berlin, Germany. A telpherage or similar system in which the movement of the car back and forth and the raising and lowering gear are remote controlled.

1,039,279. Connector. W. P. Hammond, Passaic, N. J., assignor to American Ever-Ready Co. Has a pair of jaws each with a pair of plates adapted to engage a binding post.

1,039,298. Step-by-Step Insulation for Electric Conductors or the Like. K. Kurba, assignor to Siemens-Schuckert Werke G. M. B. H., Berlin, Germany. A condenser-type terminal with alternating layers of insulation and conducting material.

1,039,299. Trap. Leopold Labecki, Perth Amboy, N. J. An electric rat trap with contact plates short-circuited by the animal.

1,039,307. Armature Winding. J. F. McElroy, assignor to United States Light & Heating Co., New York, N. Y. A multiple winding for multipolar generators.

1,039,324. Electric Signal and Train Control. J. H. Sanor and E. W. Conkell, Canton, O., said Conkell assignor to said Sanor. Controls audible and visual signals in the cab and air-brake application.

1,039,346. Trolley-Pole Retriever. E. B. Wintrode, deceased, by A. H. Wintrode, administrator, Los Angeles, Cal. The pole is made to fall after an excessive upward movement.

1,039,361. Car Attachment. E. E. Campbell, Tacoma, Wash. A trolley retriever including a number of levers, one of which is weighted.

1,039,387. Alternating-Current Meter. K. H. Gyr, assignor to firm of Landis & Gyr, Zug, Switzerland. A specially arranged magnetic system for an induction meter.

1,039,392. Lock-Snap Contact for Making Electrical Connections. J. O. Heinze, Jr., Lowell, Mass. A pair of spring plates engages a spool-shaped metallic terminal.

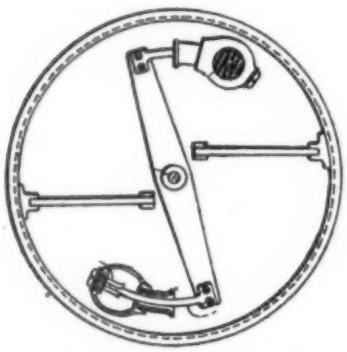
1,039,395. Expulsion Switch. E. M. Hewlett, assignor to General Electric Co. In an oil switch the oil is forced under pressure against the arcs around the contacts.

1,039,407. Sparking Regulator for Internal-Combustion Engines. G. W. Hutchinson, Auckland, New Zealand. A governor controls the commutator through a sliding rod, rack and toothed wheel.

1,039,410. Telegraphic Instrument. L. H. Jernigan, Sacramento, Cal., assignor of seven hundredths each to E. H. Carpenter, W. H. Bost, W. E. Weaver, A. M. Cabler, R. R. Fletcher, D. E. Gilman and R. E. Trickle. A special key with a vibrating wire.

1,039,415. Process of Oxidizing or Reducing Chemical Substances by Way of Electrolysis. G. Kolsky, New York, N. Y. Provides two concentric perforated spherical electrodes, of which the inner one is rapidly rotated.

1,039,418. Apparatus for Controlling the Passage of Vehicles Along a Railway. A. C. Livermore, assignor to Union Switch & Signal Co., Swissvale, Pa. A track switch is electrically controlled.



1,039,395.—Expulsion Oil Switch.

1,039,422 to 1,039,424. Connector for Electric Conductors. H. F. Maxim, Norfolk, Va., assignor of one-half to O. Wells. The wire is gripped between a spring finger and the walls of a tubular casing.

1,039,443. Telephonic Transmitting Appliance. J. K. Rhodes, assignor to K. M. Turner, Jamaica, N. Y. A transmitter for deaf persons includes adjustable resistances about part of the case.

1,039,454. Magneto-Electric Machine. F. R. Simms, assignor to Simms Magneto Co., New York, N. Y. Includes a rotary contact breaker controlling the primary circuit of the armature.

1,039,463. Electrical Resistance. E. Thomson, assignor to General Electric Co. Contains silicon and an inert silicious material.

1,039,467. Electricity Meter. G. M. Willis, assignor to Willis Electric Meter Co., Chicago, Ill. The armature is wound on a spherical support and entirely surrounded by an insulating spherical shell.

1,039,476. Aerial Illuminating Mechanism. A. J. Austin, Los Angeles, Cal. A captive balloon carries an electric searchlight fed through the cable from a stationary power plant.

1,039,502. Trolley Retriever. A. R. Dunlop, Columbus, O., assignor to Jeffrey Manufacturing Co. Includes a carriage moved by a spring to control the trolley arm.

1,039,522. Arc-Light Electrode. E. J. Guay, assignor to General Electric Co. Is composed of titanium carbide 25 per cent; cerium fluoride 20 per cent; cerium tungstate 15 per cent; cryolite 5 per cent; carbon 35 per cent.

1,039,542. Electrical Connector. W. O. Kennington, assignor to Simms Magneto Co., New York, N. Y. Includes a sleeve, a nipple within it and a screw plug for clamping the parts together.

1,039,543. High-Tension Magneto-Electric Machine. W. O. Kennington, assignor to Simms Magneto Co. The trailing pole tips have an extended shoe to give two sparking positions to the armature.

1,039,553. Electric Cigar-Lighter. J. Leveen and M. L. Ashbaugh, Anderson, Ind. A dip carries a wick ignited by engaging spaced electric contacts.

1,039,556. Electric Fixture. A. R. Lockwood, Spokane, Wash. Has a telescoping chandelier stem with sliding electric contacts.

1,039,564. Speed-Comparing Device. J. V. Matthews and E. L. Kyle, Philadelphia, Pa. Each of the machines to be compared is connected to an interconnected electric indicator set.

1,039,568. Motor Control. R. H. McLain, assignor to General Electric Co. Includes a relay for short-circuiting a resistance in the field circuit.

1,039,577. Self-Cooled Transformer. J. J. Mullen, assignor to Moloney Electric Co., St. Louis, Mo. Vertical air ducts are arranged inside and close to the casing.

1,039,589. Trolley Wheel. J. W. Pennell, Youngstown, O. On each side of the trolley wheel is a replacing wheel.

1,039,600. Safety Switch. H. B. Shreve, assignor to L. B. Jenks, Chicago, Ill. An inclosed plunger-type circuit-breaker.

1,039,644. Electric Push-Button Switch. J. Brunner, Oelenburg, Germany. Has two separate compartments containing mercury.

1,039,645. Series Lamp Fixture, C. L. Bundy, assignor to Philadelphia Electrical & Manufacturing Co., Philadelphia, Pa. A weatherproof lamp socket with canopy and shade-holder.

1,039,656. Cordless Jack Box. E. E. Dildine and J. A. Rugh, assignors to Sandwich Electric Co., Sandwich, Ill. Has one set of contacts for a telephone line and another for the exchange telephone set, insertion of a plug connecting the two together.

1,039,657. Apparatus for Winding the Filaments of Incandescent Electric Lamps on Their Supports. G. Dobkevitch, assignor to Société Internationale De La Lampe Electrique O. R., Paris, France. Includes a set of arms that can be moved toward or axially away from a central shaft.

1,039,667. Emergency Signaling Device for Telephone-Exchange Systems. I. D. Fellows, Syracuse, N. Y., assignor of one-half to J. H. McCartney. A howling noise is impressed on the line when the receiver is left off its hook for a long time.

1,039,670. Electrical Rosette. W. J. Gagnon, assignor to Bryant Electric Co., Bridgeport, Conn. Has strain-relieving abutments holding each wire in an S-bend.

Patents That Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office) that expired October 1, 1912:

546,996. Armature for Electric Motors and Dynamo-Electric Machines. H. Chitty, London, Eng.

547,031. Contact for Electrically Propelled Vehicles. E. B. W. Reichel, Charlottenburg, Germany.

547,034. Electric Vibrator Mechanism. F. J. Russell, New York, N. Y.

547,035. Electrical Indicating Mechanism. F. J. Russell, New York, N. Y.

547,043. Rectifier for Electrical Currents. W. J. Still, Toronto, Can.

547,068. Electric Motor Truck. W. G. Gaither and W. R. Gaither, Chicago, Ill.

547,072. Electric Device for Controlling Actions of Musical Instruments. F. W. Hedgeland, Chicago, Ill.

547,077. Electric-Railway Repair Wagon. Anthony Iske and Albert Iske, Lancaster, Pa.

547,078. Electrical Junction Box. W. S. Johnson, Milwaukee, Wis.

1,039,670.—Rosette.

547,127. Electric Arc Lamp. J. W. T. Olan, New York, N. Y.

547,149. Electric Switch. N. Marshall, Boston, Mass.

547,215. Portable Electric Drill. J. W. Jaimison, Vallejo, and John M. Edmunds, Napa, Cal.

547,230. Automatic Electric Switch. G. W. Russell, Jr., and A. V. Officer, Denver, Colo.

547,240. Electrical Safety Apparatus for Railways. L. W. Briggs, Chicago, Ill.

547,246. Mast Arm for Electric Lamps. J. I. Drake, Providence, R. I.

547,249. Incandescent Lamp. H. Green, Hartford, Conn.

547,265. Telephone. H. T. Johnson, Elizabeth, N. J.

547,302. Electric Motor for Street Cars. W. Stine, Omaha, Neb.

547,304. Conduit Supply System for Electric Railways. G. Tolmie, Carbon, Wyo.

547,323. Electric Motor. A. E. Boggs, Allegheny, and F. J. Cleaver, Beltzhoover, Pa.

547,358. Electric Synchronizer for Clocks. H. S. Prentiss, Elizabeth, N. J.

547,369. Device for Controlling Speed of Electric Cars. J. Brady, Brooklyn, N. Y.

547,383. Reciprocating Electric Engine. F. B. Rae, Detroit, Mich.

547,388. Telephone-Exchange System. E. E. Yaxley and J. H. Riley, Chicago, Ill.

547,405. Telephone Toll Apparatus. G. K. Thompson, Malden, Mass.